lenovo

Installation and User Guide

ThinkThinkThinkServerThink

ThinkServer RD210 Types 3795, 3796, 3818, and 3819

ThinkServer RD210 Types 3795, 3796, 3818, and 3819

lenovo

Installation and User Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 171 and the *Warranty and Support Information* document on the *ThinkServer Documentation* DVD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Statement 1:

DANGER

> **Electrical current from power, telephone, and communication cables is hazardous.**
>
> **To avoid a shock hazard:**
> *   **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
> *   **Connect all power cords to a properly wired and grounded electrical outlet.**
> *   **Connect to properly wired outlets any equipment that will be attached to this product.**
> *   **When possible, use one hand only to connect or disconnect signal cables.**
> *   **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
> *   **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
> *   **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only the battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

• **Throw or immerse into water**
• **Heat to more than 100°C (212°F)**
• **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

• **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
• **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:
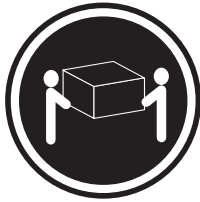
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
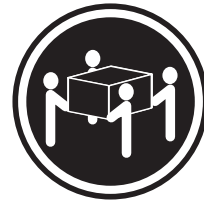
CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2
1

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 26:

CAUTION:
Do not place any object on top of rack-mounted devices.

This server is suitable for use on an IT power-distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

Chapter 1. Introduction

The Lenovo® ThinkServer™ RD210 Types 3795, 3796, 3818, and 819 server is a 1-U-high rack model server for-volume network transaction processing. The high-performance, dual-core, or quad-core server is ideally suited for networking environments that require superior microprocessor performance, input/output (I/O) flexibility, and high manageability.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

The server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

You can obtain up-to-date information about the server and other Lenovo server products at http://www.lenovo.com/thinkserver.

The server comes with the *ThinkServer EasyStartup* DVD to help you configure the hardware, install device drivers, and install the operating system.

This server supports six 2.5-inch hot-swap Serial Attached SCSI (SAS) hard disk drives. The illustrations in this document might differ slightly from your model.

Record information about the server in the following table.

Product name	ThinkServer RD210
Machine types	3795, 3796, 3818, and 3819
Model number	_____
Serial number	_____

The model number and serial number are on the ID label on the ID label on the bezel **1** , as shown in the following illustration.
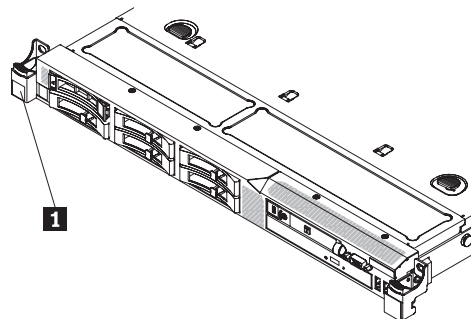
Note: The illustrations in this document might differ slightly from your hardware. The server comes with the *ThinkServer EasyStartup* DVD to help you configure the hardware and install the operating system.

For a list of supported optional devices for the server, see http://www.lenovo.com/thinkserver.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the Lenovo *ThinkServer Documentation* DVD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Related documentation

The Lenovo *ThinkServer Documentation* DVD contains documentation for the server in Portable Document Format (PDF). The Lenovo *ThinkServer Documentation* DVD requires the following minimum hardware and software:

- Adobe® Acrobat Reader 5.0 (or later) or xpdf, which comes with Linux® operating systems

The following table describes the content and location of documentation that is provided with your server.

Document	Description	Location
Read Me First	This document directs you to the *ThinkServer Documentation* DVD for complete warranty and support information.	printed, provided in server packaging
Important Notices	This document includes safety and legal notices that you are expected to read before using the server.	printed, provided in server packaging
Rack Installation instructions	This document provides instructions on how to install your server in a rack.	English is printed and provided in server packaging. Additional languages are provided on the *ThinkServer Documentation* DVD and on the Lenovo Support Web site.
Hardware Maintenance Manual	This document provides diagnostic information, parts listing, and replacement procedures for all field replaceable units (parts replaced by trained service personnel) as well as all customer replaceable units (CRUs).	Lenovo Support Web site: http:// www.lenovo.com/ support
Warranty and Support Information	This document includes the warranty statement and information about how to contact Lenovo Support.	Available on the *ThinkServer Documentation* DVD.
Safety Information	This document includes translations of all of the safety statements used in the ThinkServer documentation.	Available on the *ThinkServer Documentation* DVD.

Chapter 2. Server setup roadmap

The installation process varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and just needs to be installed in the rack, connected to power and the network, and started. In other cases, the server needs to have hardware features installed, requires hardware and firmware configuration, and required the operating system to be installed.

Task	Where to find information
Unpack	7
Install hardware features	Chapter 5, "Installing optional devices and replacing customer replaceable units," on page 39
Install in the rack	*Rack Installation Instructions* (printed and on *ThinkServer Documentation* DVD
Connect Ethernet cable and power cords to network and power connectors	"Rear view" on page 25
Start to verify operation	"Turning on the server" on page 35
Review UEFI settings and customize as needed.	"Using the Setup Utility" on page 116
Configure RAID controllers and arrays	"Configuring RAID controllers" on page 122
Install operating system and basic drivers	"Using the *EasyStartup* DVD" on page 127
Install any additional drivers needed for added features	Refer to the instructions that came with the hardware option.
Configure Ethernet settings in operating system	See the operating system help. This step is not required if the operating system was installed using the ThinkServer EasyStartup program.
Check for firmware and driver updates.	See the Lenovo Support Web site: 1. Go to: http://www.lenovo.com/support. 2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list. 3. From **Family** list, select **ThinkServer RD210**, and click **Continue**. 4. Click **Downloads and drivers** to download firmware updates.
Test Integrated Management Module(requires the presence of the IMM Premium option)	"Using the integrated management module" on page 133
Install integrated management applications	"Installing ThinkServer EasyManage software" on page 134
Install applications	Refer to the documentation that accompanies the applications that you want to install.

Chapter 3. What is included with your server

The RD210 server package includes the server, rail kit and rail kit instructions, as well as printed documentation, the *ThinkServer Documentation* DVD, and software media.

1	Power cord
2	Cable management arm
3	Rail kit
4	Server
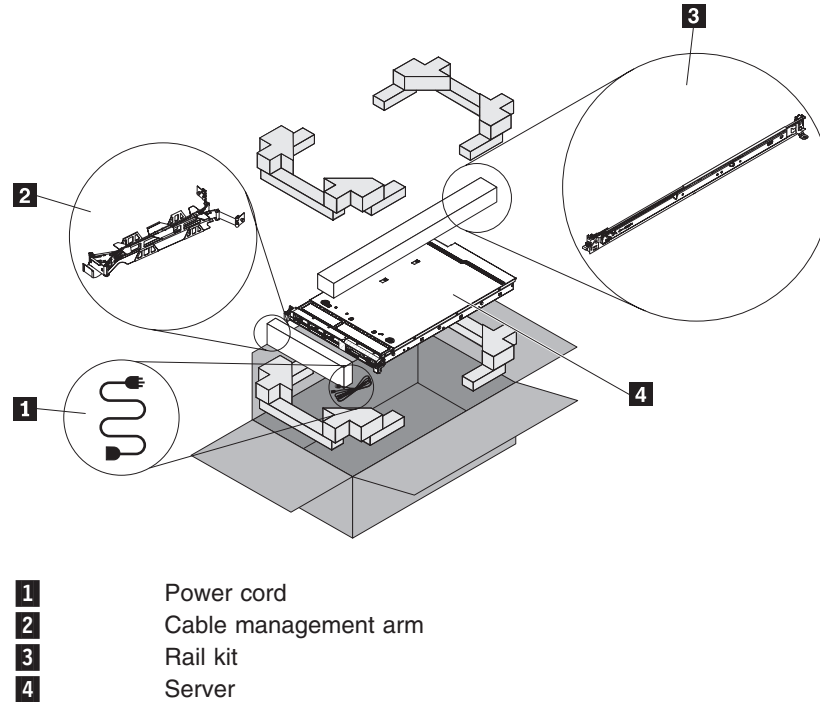
Features and technologies

The server uses the following features and technologies:

- **UEFI-compliant server firmware**

  UEFI replaces the basic input/output system (BIOS) and defines a standard interface between the operating system, platform firmware, and external devices. The server design combines the UEFI capabilities and features with legacy BIOS compatibility. UEFI-compliant servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

  Note: This server does not support DOS.

- **Dual-core or quad-core processing**

  The server supports up to two Xeon™ dual-core or quad-core microprocessors. The server comes with only one microprocessor installed.

- **Integrated Management Module**

  The Integrated Management Module (IMM) combines service processor functions, video controller, and (when IMM Premium is installed) remote presence function in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM Premium also provides a virtual presence capability

for remote server management capabilities. The IMM provides remote server management through the following industry-standard interfaces:

– Intelligent Platform Management Interface (IPMI) version 2.0

– Simple Network Management Protocol (SNMP) version 3

– Common Information Model (CIM)

– Web browser

- **Remote presence capability and blue-screen capture**

  IMM Premium is required to enable the remote presence and blue-screen capture features. The remote presence feature provides the following functions:

  – Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state

  – Remotely accessing the server, using the keyboard and mouse from a remote client

  – Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server

  – Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

  The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

- **Large system-memory capability**

  The memory bus supports up to 128 GB of system memory. The memory controller supports error correcting code (ECC) for up to 16 industry-standard PC3-10600R-999 (single-rank or dual-rank), 800, 1067, and 1333 MHz, DDR3 (third-generation double-data-rate), registered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Integrated network support**

  The server comes with an integrated dual-port Broadcom Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see "Configuring the Gigabit Ethernet controllers" on page 138.

- **Integrated Trust Platform Module**

  This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification.

- **Large data-storage capacity and hot-swap capability**

  The server supports a maximum of six 2.5-inch hot-swap Serial Attached SCSI (SAS) hard disk drives or hot-swap Serial ATA (SATA) hard disk drives.

  With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **EasyLED diagnostics**

  EasyLED diagnostics provides LEDs to help you diagnose problems. For more information about the EasyLED, see "EasyLED diagnostics panel" on page 17.

- **PCI adapter capabilities**

  The server has two PCI interface slots (one supports low-profile cards and one supports half-length, full-height cards). Both slots can support PCI Express adapters. See "Removing and installing an adapter" on page 55 for detailed information.

- **Redundant connection**

  The addition of an optional Ethernet daughter card provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection and the optional Ethernet daughter card is installed on the server, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet daughter card connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling and optional power capabilities**

  The server supports a maximum of two 675-watt hot-swap power supplies and six hot-swap fans, which provide redundancy and hot-swap capability for a typical configuration. The redundant cooling by the fans in the server enables continued operation if one of the fans fails. The server comes with one 675-watt hot-swap power supply and five fans. You can order the second optional power supply with the additional fan.

- **RAID support**

  The RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The standard RAID adapter provides RAID levels 0, 1, and 1E. An optional RAID adapter is available for purchase that provides RAID levels 0, 1, 5, 6, 10, 50, and 60.

- **Systems-management capabilities**

  The servers comes with an Integrated Management Module (IMM). When the IMM is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The IMM also provides system monitoring, event recording, and network alert capability. The system-management connector provides additional security by physically separating the management network traffic from the production network. You can use the Setup utility to configure the server to use a dedicated systems-management network or a shared network.

- **TCP/IP offload engine (TOE) support**

  The Ethernet controllers in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessor and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE.

  Note: The Linux operating system does not support TOE.

- **Preboot diagnostics program**

  The preboot diagnostics programs are stored on the integrated USB memory. They collect and analyze system information to aid in diagnosing server problems. The diagnostic programs collect the following information about the server:
  - System configuration
  - Network interfaces and settings
  - Installed hardware
  - EasyLED status
  - Service processor status and configuration
  - Vital product data, firmware, and UEFI (formerly called BIOS) configuration
  - Hard disk drive health
  - RAID controller configuration
  - Event logs for RAID controllers and service processors

The diagnostics programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to service and support. Additionally, you can view the information locally through a generated text report file. You can also copy the log to a removable media and view the log from a Web browser.

For additional information about diagnostics, see the *Hardware Maintenance Manual*.

- **EasyStartup DVD**

  The ThinkServer EasyStartup program guides you through the configuration of the RAID controller and the installation of the operating system and device drivers. See "Using the *EasyStartup* DVD" on page 127 for details.

- **EasyManage DVD**

  The ThinkServer EasyManage program helps you manage and administer your servers through remote problem notification as well as monitoring and alerting.

Specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 1. Features and specifications

Microprocessor:

- Supports up to two Intel® Xeon™ microprocessors, dual-core (two cores per microprocessor with 4 MB shared among cores) or quad-core (four cores per microprocessor with 8 MB shared among cores)
- Level-2 cache
- QuickPath Interconnect (QPI) links speed up to 6.4 GT per second

Note:

- Use the Setup Utility program to determine the type and speed of the microprocessors.
- For a list of supported microprocessors, go to www.lenovo.com/thinkserver and click on the **Options & Software** tab.

Memory:

- Minimum: 1 GB
- Maximum: 128 GB
- Type: PC3-10600R-999 (single-rank or double-rank) or PC3-8500R-777 (quad-rank), 800, 1067, and 1333 MHz, ECC, DDR3 registered SDRAM DIMMs only
- Slots: 16 dual inline
- Supports 1 GB, 2 GB, 4 GB, and 8 GB (when available) DIMMs

SATA optical drives (depending on your model):

- CD-RW/DVD-ROM combo (on standard models)
- DVD-ROM (optional)
- Multi-burner (Rambo) (optional)

Hard disk drive expansion bays (depending on the model):

- Six 2.5-inch hot-swap SAS or hot-swap SATA hard disk drive bays

PCI expansion slots:

Supports two PCI riser slots:
- Slot 1 supports low-profile cards (PCI Express Gen2 x16)
- Slot 2 supports half-length, full-height cards (PCI Express Gen2 x16)

Power supply:

- One power supply standard
- Maximum of two 675-watt ac (110 or 220 V ac auto-sensing) hot-swap power supplies for redundancy support

Hot-swap fans:

The server comes standard with six hot-swap fans.

Size:

- Height: 43 mm (1.69 inches, 1 U)
- Depth: 711 mm (28 inches)
- Width: 440 mm (17.3 inches)
- Maximum weight: 15.4 kg (34 lb) when fully configured

Integrated functions:

- Integrated Management Module (IMM), which provides service processor control and monitoring functions, video controller, and (when IMM Premium is installed) remote keyboard, video, mouse, and remote hard disk drive capabilities
- Broadcom BCM5709 Gb Ethernet controller with TCP/IP Offload Engine (TOE)
- Five Universal Serial Bus (USB) 2.0 ports
- Four Ethernet ports (two on system board and two additional ports when the optional Dual-Port 1 Gb Ethernet Daughter Card is installed)
- One System Management RJ-45 on the rear to connect to a systems management network. This system management connector is dedicated to the IMM functions. This connector is active with or without IMM Premium.
- One serial port

RAID controllers:

- A ServeRAID-BR10i SAS/SATA Controller that provides RAID levels 0, 1, and 1E (comes standard on some hot-swap SAS and hot-swap SATA models).
- An optional ServeRAID-MR10i SAS/SATA Controller that provides RAID levels 0, 1, 1E, 5, 6, and 10 can also be ordered.

Acoustical noise emissions:

- Sound power, idling: 6.1 bels maximum
- Sound power, operating: 6.1 bels maximum

Environment:

- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 914 m (2998.7 ft)
  - Server off: -40° to 60°C (-104° to 140°F); maximum altitude: 2133 m (6998.0 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 662 Btu per hour (194 watts)
- Maximum configuration: 2302 Btu per hour (675 watts)

Electrical input:

- Sine-wave input (47-63 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA), approximately:
  - Minimum: 0.194 kVA
  - Maximum: 0.700 kVA

Video controller (integrated into IMM):

- Matrox G200 (two analog ports - one front and one rear that can be connected at the same time)
  Note: The maximum video resolution is 1280 x 1024 at 75 Hz.
  - SVGA compatible video controller
  - DDR2 250 MHz SDRAM video memory controller
  - Avocent Digital Video Compression
  - Video memory is not expandable

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.

2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Software

Lenovo provides software to help get your sever up and running.

EasyStartup

The ThinkServer EasyStartup program simplifies the process of configuring your RAID controllers and installing supported Windows and Linux operating systems and device drivers on your server. The EasyStartup program is provided with your server on DVD. The DVD is self starting (bootable). The User Guide for the EasyStartup program is on the DVD and can be accessed directly from the program's interface. For additional information, see "Using the *EasyStartup* DVD" on page 127.

EasyManage

The ThinkServer EasyManage Core server provides centralized hardware and software inventory management and secure automated system management through a centralized console. The ThinkServer EasyManage Agent enables other clients on the network to be managed be the centralized console. The ThinkServer EasyManage Core Server is supported on 32-bit Windows Server 2003 and 32-bit Windows Server 2008 products. The ThinkServer EasyManage Agent is supported on 32-bit and 64-bit Windows Red Hat and SUSE operating systems.

Reliability, availability, and serviceability

Three important computer design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in the server, the availability of the server when you need it, and the ease with which you can diagnose and correct problems.

Your server has the following RAS features:
- 1-year parts and 1-year labor or 3-year labor and 3-year labor limited warranty
- Automatic error retry and recovery
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic restart after a power failure
- Backup basic input/output system switching under the control of the Integrated Management Module (IMM)
- Built-in monitoring for fan, power, temperature, voltage, and power-supply redundancy
- Cable-presence detection on most connectors
- Advanced ECC memory protection
- Diagnostic support for RAID and Ethernet adapters
- Error codes and messages
- Error correcting code (ECC) L2 cache and system memory
- Hot-swap cooling fans with speed-sensing capability
- Hot-swap hard disk drives
- Information and EasyLED Diagnostics LED panels
- Integrated Management Module (IMM)
- Menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration programs
- Microprocessor built-in self-test (BIST), internal error signal monitoring, configuration checking, and microprocessor and voltage regulator module failure identification through EasyLED
- Memory mirroring support Redundant Ethernet capabilities with failover support
- Parity checking on the small computer system interface (SCSI) bus and PCI buses

- Power management: Compliance with Advanced Configuration and Power Interface (ACPI)
- Power-on self-test (POST)
- Hardware Failure Protection alerts on memory, microprocessors, SCSI hard disk drives, fans, and power supplies
- Redundant hot-swap power supplies and redundant hot-swap fans (some models)
- Redundant Network Interface Card (NIC) support
- Remind button to temporarily turn off the system-error LED
- Remote system problem-determination support
- ROM-based diagnostics
- ROM checksums
- Serial Presence Detection (SPD) on memory, VPD, power supply, and hard disk drives backplane
- Single-DIMM isolation of excessive correctable error or multi-bit error by the Unified Extensible Firmware Interface (UEFI - formerly called BIOS)
- Standby voltage for system-management features and monitoring
- Startup (boot) from LAN through remote initial program load (RIPL) or dynamic host configuration protocol/boot protocol (DHCP/BOOTP)
- System auto-configuring from the configuration menu
- System-error logging (POST and IMM)
- System-management monitoring through the Inter IC protocol
- Upgradeable POST, Unified Extensible Firmware Interface (UEFI), diagnostics, IMM firmware, and read-only memory (ROM) resident code, locally or over the LAN
- Vital product data (VPD) on microprocessors, system board, power supplies, SAS/SATA (hot-swap-drive) backplane, and power backplane

Chapter 4. Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Note: The illustrations in this document show the 3.5-inch hard disk drive models, unless specifically indicated otherwise.

Front view

The following illustration shows the controls, light-emitting diodes (LEDs), and connectors on the front of the server.

1	Hard disk drive activity LED (green)	**11**	Rack release latch
2	Hard disk drive status LED (amber)	**12**	USB 2 connector
3	Drive bay 0	**13**	Optical drive eject button
4	Drive bay 2	**14**	Optical drive activity LED
5	Drive bay 4	**15**	Optical drive bay
6	Power-control button and LED	**16**	Drive bay 5
7	Operator information panel	**17**	Drive bay 3
8	Operator information panel release latch	**18**	Drive bay 1
9	Video connector	**19**	Rack release latch
10	USB 1 connector		

- **Hard disk drive activity LEDs:** This LED is used on SAS or SATA hard disk drives. Each hot-swap hard disk drive has an activity LED, and when this LED is flashing, it indicates that the drive is in use.
- **Hard disk drive status LEDs:** This LED is used on SAS or SATA hard disk drives. When this LED is lit, it indicates that the drive has failed. If an optional RAID controller is installed in the server, when this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.
- **Operator information panel:** This panel contains controls and LEDs that provides information about the status of the server.
- **Operator information panel release latch:** Slide the blue release latch to the left to pull out the EasyLED panel and view the EasyLED LEDs and buttons. See "EasyLED diagnostics panel" on page 17 for more information about the EasyLED.
- **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.
- **USB connectors:** Connect a USB device, such as a USB mouse, keyboard, or other device to any of these connectors.

- **Rack release latches:** Press the latches on each front side of the server to remove the server from the rack.
- **CD-RW/DVD eject button:** Press this button to release a DVD or CD from the CD/DVD drive.
- **CD-RW/DVD drive activity LED:** When this LED is lit, it indicates that the CD-RW/DVD drive is in use.

Operator information panel

The following illustration shows the controls and LEDs on the operator information panel.
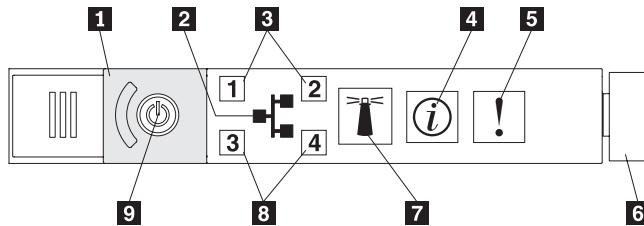
1	Power-control button cover	**6**	Release latch
2	Ethernet icon LED	**7**	Locator button/locator LED
3	Ethernet activity LEDs	**8**	Ethernet activity LEDs
4	Information LED	**9**	Power-control button/power-on LED
5	System-error LED		

- **Ethernet activity LEDs:** When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.
- **System-locator button/LED:** Use this blue LED to visually locate the server among other servers. This LED is controlled by the IMM.
- **System-information LED:** When this amber LED is lit, it indicates that a noncritical event has occurred. Check the error log for additional information. See the *Hardware Maintenance Manual* for more information about error logs.
- **System-error LED:** When this amber LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the EasyLED panel on the operator information panel is also lit to help isolate the error. This LED is controlled by the IMM.
- **Power-control button and power-on LED:** Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows:

    Off: AC power is not present, or the power supply or the LED itself has failed.

    Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 1 to 3 minutes.

    Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

    Lit: The server is turned on.

    Fading on and off: The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface. See "Logging on to the Web interface" on page 138 for information on logging on to the IMM Web interface.

EasyLED diagnostics panel

The EasyLED diagnostics panel is located on the top of the operator information panel.

Note: The system service label on the underside of the cover also provides information about the location of the EasyLED.

To access the EasyLED diagnostics panel, slide the blue release button on the operator information panel to the left. Pull forward on the unit until the hinge of the operator panel is free of the server chassis. Then pull down on the unit, so that you can view the EasyLED panel information.

Note: When you slide the EasyLED diagnostics panel out of the server to check the LEDs or checkpoint codes, do not run the server continuously with EasyLED diagnostics panel outside of the server. The panel should only be outside of the server a short time. The EasyLED panel must remain in the server when the server is running to ensure proper cooling.
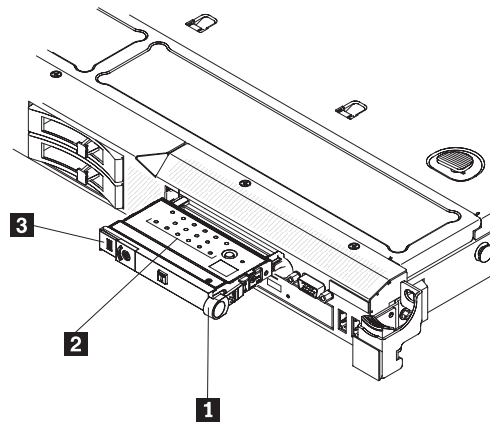
1	Release latch
2	EasyLEDs
3	Operator information panel

The following illustration shows the LEDs and controls on the EasyLED panel.
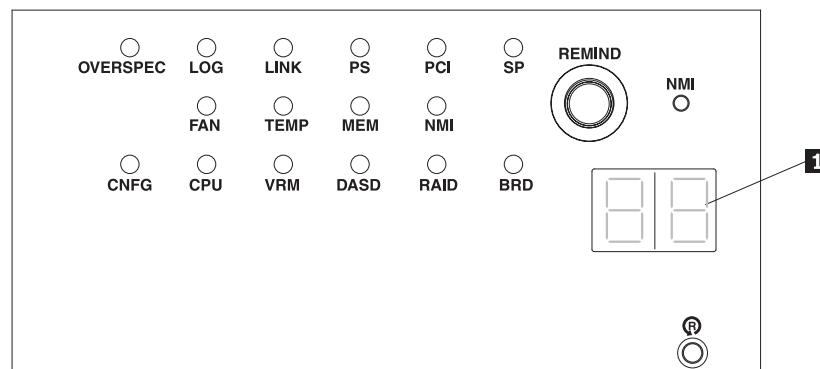
- **Remind button:**This button places the system-error LED on the front panel into Remind mode. In Remind mode, the system-error LED flashes rapidly until the problem is corrected, the system is restarted, or a new problem occurs.

By placing the system-error LED indicator in Remind mode, you acknowledge that you are aware of the last failure but will not take immediate action to correct the problem. The remind function is controlled by the IMM.

- **NMI button**: Press this button to force a nonmaskable interrupt to the microprocessor. You might have to use a pen or the end of a straightened paper clip to press the button. It allows you to blue screen the server and take a memory dump (use this button only when directed by service personnel).

- **Checkpoint code display:** This display **1** provides a checkpoint code that indicates the point at which the system stopped during the boot block and POST. A checkpoint code is either a byte or a word value that is produced by UEFI. The display does not provide error codes or suggest components to be replaced. Checkpoint codes can be used by service and support for more in-depth troubleshooting. By using the checkpoint code display, you do not have to wait for the video to initialize each time you restart the server.

  There are two types of checkpoint codes: field programmable gate array (FPGA) hardware checkpoint codes and UEFI checkpoint codes. The UEFI checkpoint codes might change because of code sequence and timing changes or when the server firmware is updated.

- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The Reset button is in the lower-right corner of the EasyLED panel.

The following table lists the LEDs on the EasyLED diagnostics panel and suggests
actions to solve the detected problems.

Table 2. EasyLED diagnostics

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**		
LED	**Description**	**Action**
None, but the system error LED is lit.	An error has occurred and cannot be isolated. The error is not represented by a path.	Use the UEFI Setup Utility program to check the system error log for information about the error.
OVER SPEC	The power supplies are using more power than their maximum rating.	If the OVER SPEC LED on the EasyLED panel is lit, or any of the six 12V channel error LEDs (A, B, C, D, E, or AUX) on the system board are lit, follow the instructions below. If the 12V channel A error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the optical drive, fans, hard disk drives, and hard disk drive backplane. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board. If the 12V channel B error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the PCI riser card in connector 1, all DIMMs, and the microprocessor in socket 2. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. (Continued on the next page)

Table 2. EasyLED diagnostics (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**		

LED	Description	Action
OVER SPEC (Continued)	The power supplies are using more power than their maximum rating.	If the 12V channel C error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the SAS/SATA RAID riser card, DIMMs in connectors 1 through 8, and the microprocessor in socket 1. **Note:** The server will not power-on when the microprocessor in socket 1 is not installed in the server. You will need to toggle the switch block (SW3) to pin 6 to power-on the server. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. If the 12V channel D error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the microprocessor in socket 1. **Note:** The server will not power-on when the microprocessor in socket 1 is not installed in the server. You will need to toggle the switch block (SW3) to pin 6 to power-on the server. 3. Restart the server to see if the problem remains. 4. Reinstall the microprocessor in socket 1 and restart the server. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. (Continued on the next page.)

Table 2. EasyLED diagnostics (continued)

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
•	**If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

LED	Description	Action
OVER SPEC (Continued)	The power supplies are using more power than their maximum rating.	If the 12V channel E error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the PCI riser card from PCI riser connector 2 and the microprocessor in socket 2. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. If the 12V AUX channel error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove all PCI Express cards, all PCI riser cards, the operator information panel, and the Ethernet daughter card (if installed). 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains.
LOG	An error occurred.	Check the IMM System Event log and the system-error log for information about the error. Replace any components identified in the error logs.
LINK	Reserved.	
PS	Power supply 1 or 2 has failed.	1. Make sure that the power supplies are seated correctly. 2. Remove one of the power supplies to isolate the failed power supply. 3. Replace the failed power supply.

Table 2. EasyLED diagnostics (continued)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

LED	Description	Action

PCI	An error has occurred on a PCI bus or on the system board. An additional LED will be lit next to a failing PCI slot.	1. Check the LEDs on the PCI slots to identify the component that caused the error.
		2. Check the system-error log for information about the error.
		3. If you cannot isolate the failing adapter using the LEDs and the information in the system-error log, remove one adapter at a time from the failing PCI bus; then, restart the server after each adapter is removed.
		4. If the problem remains, replace the following components, in the order shown, restarting the server each time:
		  • PCI riser card
		  • (Trained service technician only) Replace the system board, if the problem remains.

SP	The service processor has failed.	1. Remove power from the server; then, reconnect the server to power and restart the server. 2. Update the IMM firmware. 3. (Trained service technician only) Replace the system board, if the problem remains.
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	1. Reseat the fan. 2. Replace the failing fan, which is indicated by a lit LED next to the fan.
TEMP	The system temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit.	1. Determine whether a fan has failed. If it has, replace it. 2. Make sure that the room temperature is not too high. See Table 1 on page 11 for the server temperature information. 3. Make sure that the air vents are not blocked.

MEM	An invalid memory configuration or a memory error has occurred (both the MEM LED and the CNFG LED might be lit).	1. If the MEM LED and the CNFG LED are lit, the system issues an invalid memory configuration error. Complete the following steps to correct the problem:
		  a. Make sure that the DIMM configuration is supported.
		  b. Replace the DIMMs with a supported configuration.
		2. If the CNFG LED is not lit, the system might detect a memory error. Complete the following steps to correct the problem:
		  a. Run the memory test to isolate the problem.
		  b. If the test indicates that a memory error has occurred, replace the failing DIMM, which is indicated by the lit DIMM latch on the system board (the DIMM LED is underneath the DIMM latch).

NMI	A machine check error has occurred or the NMI button was pressed.	Check the system-error log for information about the error.

Table 2. EasyLED diagnostics (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**		
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**		
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**		

LED	Description	Action

CNFG	A hardware configuration error has occurred.	1. If the CNFG LED and the CPU LED are lit, complete the following steps to correct the problem:
		
		  a. Check the microprocessors that were just installed to make sure that they are compatible with each other (see 11 for additional information about microprocessor requirements).
		
		  b. (Trained service technician only) Replace the incompatible microprocessor.
		
		  c. Check the system-error logs for information about the error. Replace any components that are identified in the error log.
		
		2. If the CNFG LED and the MEM LED are lit, complete the following steps:
		
		  a. Make sure that the DIMM configuration is supported.
		
		  b. Replace the DIMMs with a supported configuration.

CPU	An invalid microprocessor configuration or a microprocessor has failed (both the CP LED and the CNFG LED might be lit).	1. If the CNFG LED is lit, the system issues an invalid microprocessor configuration error. Complete the following steps to correct the problem:
		
		  a. Check the microprocessors that were just installed to make sure that they are compatible with each other (see 11 for additional information about microprocessor requirements) and use the Setup utility and select **System Information → System Summary → Processor Details** to verify the microprocessors information.
		
		  b. (Trained service technician only) Replace the incompatible microprocessor.
		
		  c. Check the system-error logs for information about the error. Replace any components that are identified in the error log.
		
		2. If a microprocessor failure occurs, complete the following steps:
		
		  a. (Trained service technician only) Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is installed correctly. See 11 for information about installation and requirements.

VRM	Reserved.	

Table 2. EasyLED diagnostics (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

LED	Description	Action

DASD	A hard disk drive error has occurred.	1. Check the LEDs on the hard disk drives for the drive with a lit status LED and reseat the hard disk drive.
		2. Reseat the hard disk drive backplane.
		3. For more information, see "Hard disk drive problems" on page 146.
		4. If the error remains, replace the following components in the order listed, restarting the server after each:
		    a. Replace the hard disk drive.
		    b. Replace the hard disk drive backplane.
		5. If the error remains, replace the following components one at a time, in the order listed, restarting the server after each:
		    a. Replace the hard disk drive.
		    b. Replace the hard disk drive backplane.

RAID	Reserved.	

BRD	An error has occurred on the system board.	1. Check the LEDs on the system board to identify the component that caused the error. The BRD LED can be lit due to any of the following reasons:
		    • Battery
		    • Missing PCI riser-card assembly
		    • Failed voltage regulator
		2. Check the system-error log for information about the error.
		3. Replace any failed or missing replacement components, such as the battery or PCI riser-card assembly.
		4. If a voltage regulator has failed, (trained service technician only) replace the system board.

Rear view

The following illustration shows the LEDs on the rear of the server.

1	Slot 1, PCI Express	**11**	USB 3 connector
2	Ethernet activity LED	**12**	Serial connector
3	Ethernet link LED	**13**	System-error LED (amber)
4	Video connector	**14**	System-locator LED (blue)
5	Slot 2, PCI Express	**15**	Power-control button LED (green)
6	USB 4 connector	**16**	Ethernet 2 connector
7	AC LED (green)	**17**	Ethernet 1 connector
8	DC LED (green)	**18**	Ethernet connectors 3 and 4 (with optional 2-port Ethernet card)
9	Power supply error LED (amber)	**19**	System management Ethernet connector
10	Power cord connectors		

- **PCI slot 1:** Insert a low-profile PCI Express adapter into this slot. Standard models of the server come with two PCI Express rise assemblies installed.
- **PCI slot 2:** Insert a half-length, full-height PCI Express adapter into this slot. Standard models of the server come with two PCI Express rise assemblies installed.
- **AC power LED:** Each hot-swap power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual*.
- **DC power LED:** Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual*.
- **Power connector:** Connect the power cord to this connector.
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. The states of the power-on LED are as follows:

  Off: AC power is not present, or the power supply or the LED itself has failed.

  Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 1 to 3 minutes.

  Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

  Lit: The server is turned on.

  Fading on and off: The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the EasyLED panel is also lit to help isolate the error.

- **System-locator LED:** Use this LED to visually locate the server among other servers.
- **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.
- **Serial connector:** Connect a 9-pin serial device to this connector. The serial port is shared with the integrated management module (IMM). The IMM can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).
- **USB connectors:** Connect a USB device, such as a USB mouse, keyboard, or other device to any of these connectors.
- **Ethernet link LEDs:** When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.
- **Ethernet connectors:** Use either of these connectors to connect the server to a network. When you use the Ethernet 1 connector, the server's network can be shared with the IMM using a single network cable.
- **Systems-management Ethernet connector:** Use this connector to manage the server using a dedicated management network. By using this connector, IMM cannot be accessed directly from production network. A dedicated management network provides additional security by physically separating the management network traffic from the production network. You can use the UEFI Setup Utility to configure the server to use a dedicated systems management network or a shared network.

System-board internal connectors

The following illustration shows the internal connectors on the system board.
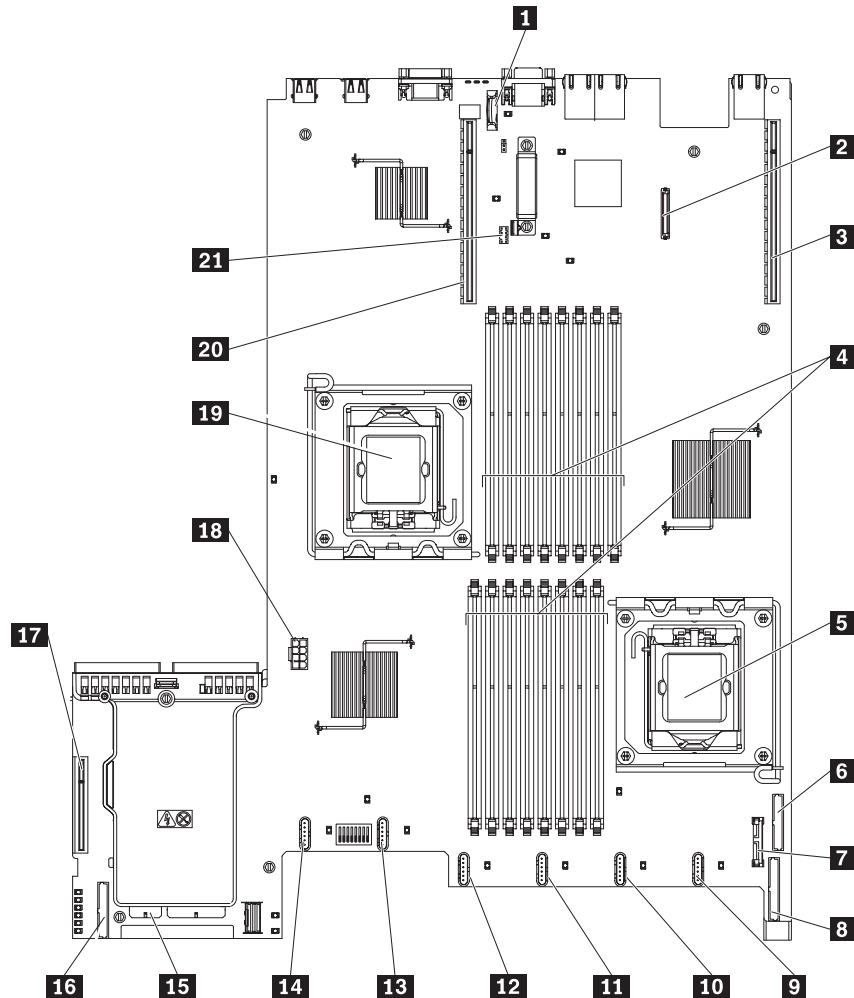
1	Battery	12	Fan 4 connector
2	Optional two-port Ethernet card connector	13	Fan 5 connector
3	PCI riser connector	14	Fan 6 connector
4	DIMM connectors	15	Fan 4 connector
5	Microprocessor 1	16	Hot-swap SAS/SATA power connector
6	Operator information panel connector	17	Hot-swap SAS/SATA configuration cable connector
7	Optical drive connector	18	Auxillary power for PCI Express graphics adapter connector
8	Front video/USB connector	19	Microprocessor 2
9	Fan 1 connector	20	PCI riser connector 2
10	Fan 2 connector	21	Virtual media key connector
11	Fan 3 connector		

System-board external connectors

The following illustration shows the external connectors on the system board.
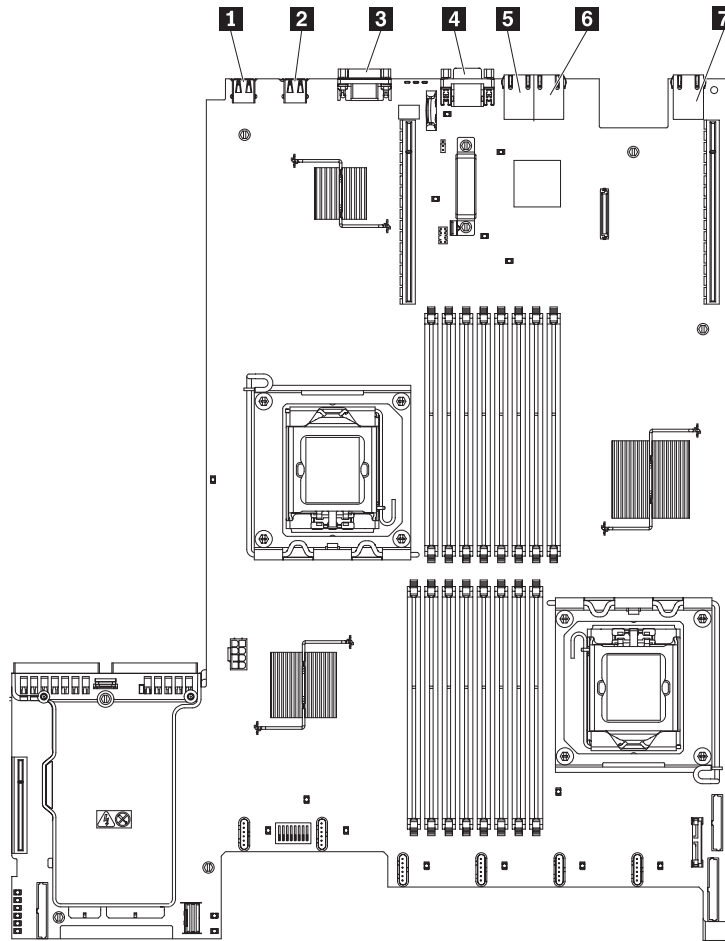
1	USB 2 connector	**5**	Ethernet 2 connector
2	USB 1 connector	**6**	Ethernet 1 connector
3	Serial connector	**7**	System management Ethernet connector
4	Video connector		

System-board optional-device connectors

The following illustration shows the connectors for user-installable optional devices.
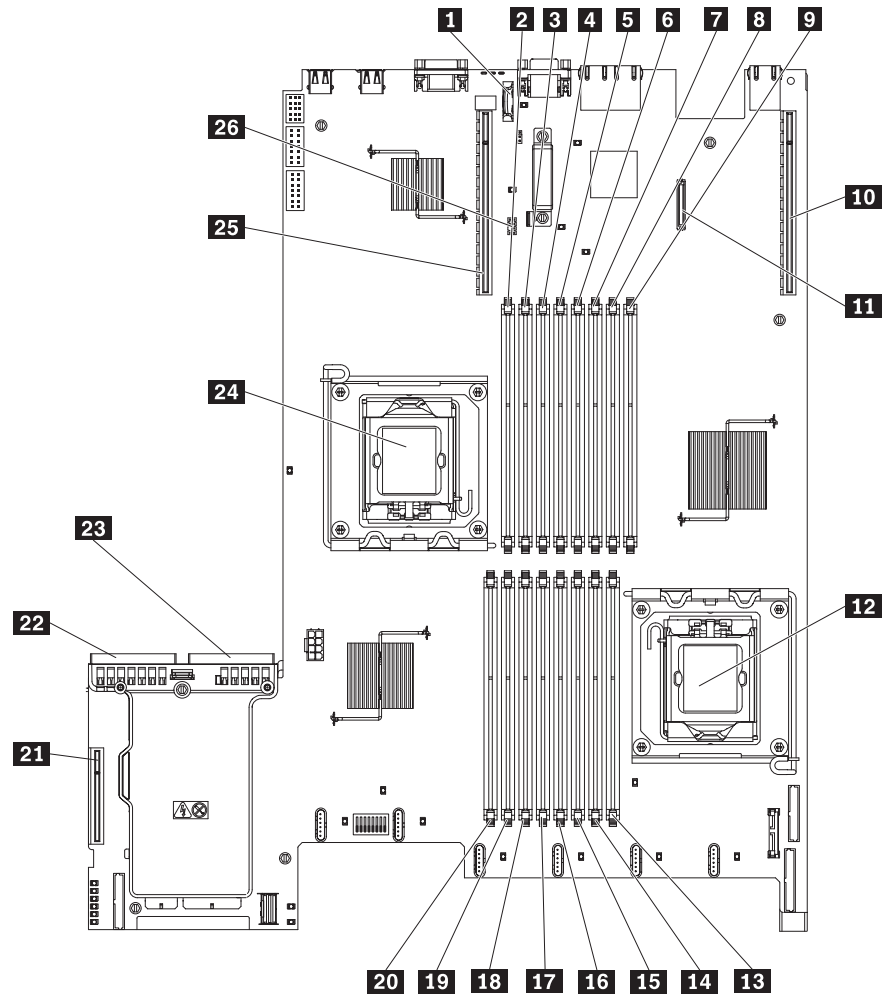
1	Battery	**14**	DIMM 2
2	DIMM 9	**15**	DIMM 3
3	DIMM 10	**16**	DIMM 4
4	DIMM 11	**17**	DIMM 5
5	DIMM 12	**18**	DIMM 6
6	DIMM 13	**19**	DIMM 7
7	DIMM 14	**20**	DIMM 8
8	DIMM 15	**21**	SAS/SATA RAID riser-card connector
9	DIMM 16	**22**	Power supply 2 connector
10	PCI riser connector 1	**23**	Power supply 1 connector
11	Optional two-port Ethernet card connector	**24**	Microprocessor 2
12	Microprocessor 1	**25**	PCI riser connector 2
13	DIMM 1	**26**	Virtual media key connector

System-board switches and jumpers

The following illustration shows the switches and jumpers on the system board.
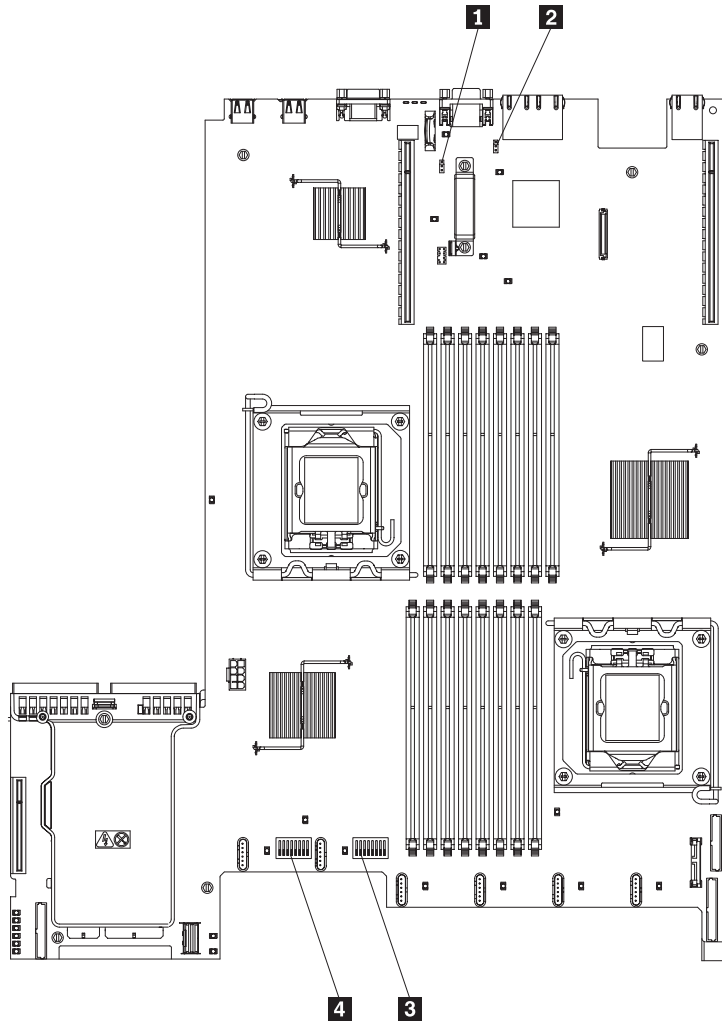
	Jumper name	Jumper setting
1	UEFI boot recovery jumper (J29)	• Pins 1 and 2: Normal (default) Loads the primary UEFI (formerly called BIOS) firmware ROM page. • Pins 2 and 3: Loads the secondary (backup) UEFI firmware ROM page.
2	IMM recovery jumper (J147)	• Pins 1 and 2: Normal (default) Loads the primary IMM firmware ROM page. • Pins 2 and 3: Loads the secondary (backup) IMM firmware ROM page.
3	SW4 switch block (reserved)	
4	SW3 switch block	

Notes:

1. If no jumper is present, the server will respond as if the pins are set to 1 and 2.
2. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on will alter which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem.

The following table describes the functions of the SW3 switch block.

Table 3. SW3 switch block definition

Switch number	Default position	Description
1	Off	Clear CMOS. When this switch is toggled to On, it clears the CMOS data, which clears the power-on password.
2	Off	Reserved.
3	Off	Reserved.
4	Off	Reserved.
5	Off	Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the UEFI Setup Utility program so that you can change or delete the power-on password. You do not have to move the switch back to the default position after the power-on password in overridden. Changing the position of this switch does not affect the administrator password check if an administrator password is set. See "Passwords" on page 119 for additional information about passwords.

Table 3. SW3 switch block definition (continued)

Switch number	Default position	Description
6	Off	When you toggle this switch to On, this causes a forced power-on which overrides the power-on and power-off button on the server and they become nonfunctional.
7	Off	Reserved.
8	Off	Reserved.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See safety information in "Safety" on page vii.

2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.
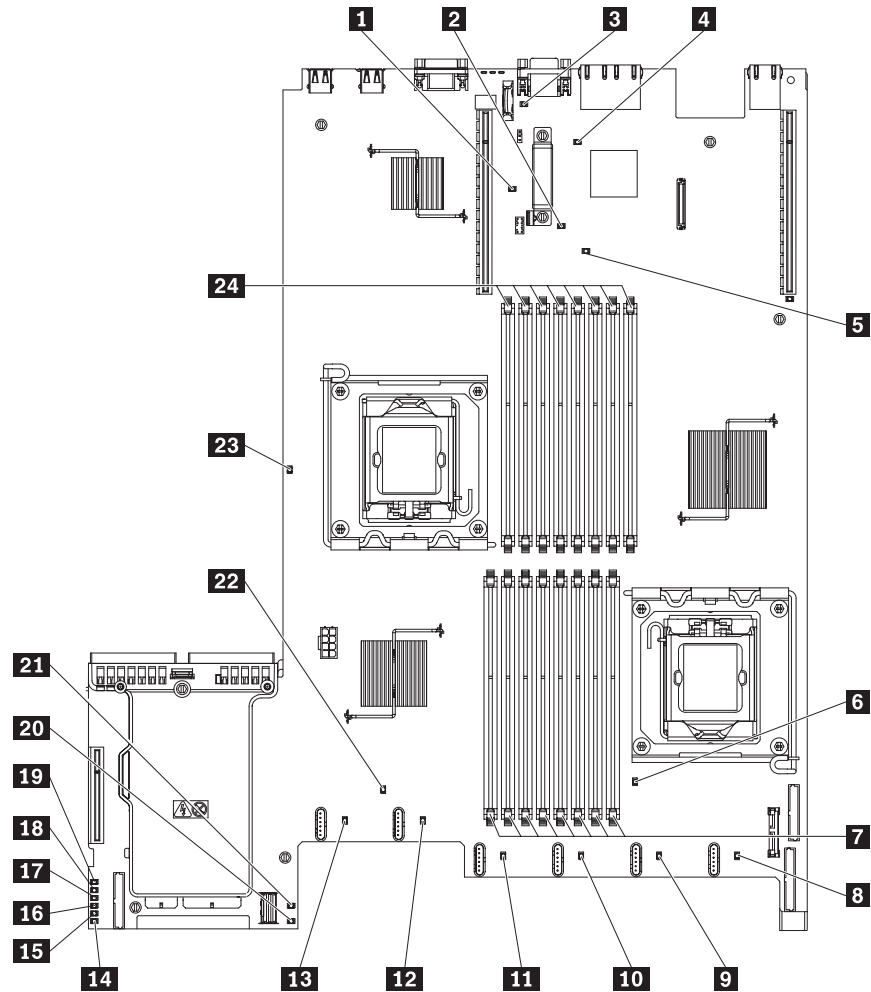
1	Slot 2 missing PCI riser card LED	**13**	Fan 6 error LED
2	Enclosure manager heartbeat LED	**14**	Power channel A error LED
3	Battery LED	**15**	Power channel B error LED
4	IMM heartbeat LED	**16**	Power channel C error LED
5	Slot 1 missing PCI riser card LED	**17**	Power channel D error LED
6	Microprocessor 1 error LED	**18**	Power channel E error LED
7	DIMM 1-8 error LEDs	**19**	Power channel F error LED
8	Fan 1 error LED	**20**	240 VA error LED
9	Fan 2 error LED	**21**	SAS/SATA RAID riser card LED
10	Fan 3 error LED	**22**	System error LED
11	Fan 4 error LED	**23**	Microprocessor 2 error LED
12	Fan 5 error LED		

Power-supply LEDs

The following illustration shows the location of the power-supply LEDs on the rear of the server. See the *Hardware Maintenance Manual* for additional information on solving power supply problems.
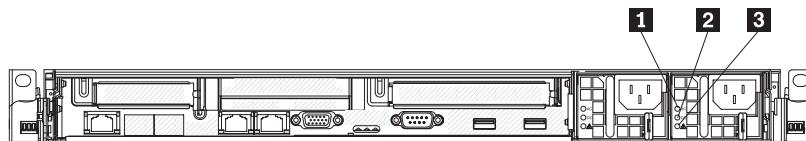
Table 4.

1	AC LED (green)
2	DC LED (green)
3	Power supply error LED (amber)

System pulse LEDs

The following LEDs are on the system board and monitors the system power-on and power-off sequencing and boot progress (see "System-board LEDs" on page 33 for the location of these LEDs):

Table 5. System pulse LEDs

LED	Description	Action
Enclosure manager heartbeat	power-on and power-off sequencing.	1. If the LED blinks at 1Hz, it is functioning properly and no action is necessary. 2. If the LED is not blinking, (trained service technician only) replace the system board.

Table 5. System pulse LEDs (continued)

LED	Description	Action

IMM heartbeat	IMM heartbeat boot process.	The following steps describe the different stages of the IMM heartbeat sequencing process.
		
		1. When this LED is blinking fast (approximately 4Hz), this indicates, that the IMM code is in the loading process.
		
		2. When this LED goes off momentarily, this indicates that the IMM code has loaded completely.
		
		3. When this LED goes off momentarily and then starts blinking slowing (approximately 1Hz), this indicates that IMM is fully operational. You can now press the power-control button to power-on the server.
		
		4. If this LED does not blink within 30 seconds of connecting a power source to the server, complete the following steps:
		
		  a. (Trained service technician only) use the IMM recovery jumper to recover the firmware (see "System-board switches and jumpers" on page 30).
		
		  b. (Trained service technician only) replace the system board.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor (the Integrated Management Module) is shut down; however, the server can respond to requests to the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Approximately 5 seconds after the server is connected to ac power, one or more fans might start running to provide cooling while the server is connected to power and the power-on button LED will blink quickly. Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active (the power-on LED will blink slowly), and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests to the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will turn off automatically.

- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.

- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.

- The integrated management module (IMM) can turn off the server as an automatic response to a critical system failure.

Chapter 5. Installing optional devices and replacing customer replaceable units

This chapter provides detailed instructions for installing optional hardware devices in the server.

Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information in "Safety" on page vii. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps:

  Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. From **Family** list, select **ThinkServer RD210**, and click **Continue**.
  4. Click **Downloads and drivers** to download firmware updates.

- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a I9990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-plug Universal Serial Bus (USB) devices.

- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see http://www.lenovo.com/thinkserver.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

You might be instructed to turn on the server while the cover is off, to look at system-board LEDs. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Major components of the server

The following illustrations show the major components in the server. The illustrations in this document might differ slightly from your hardware.
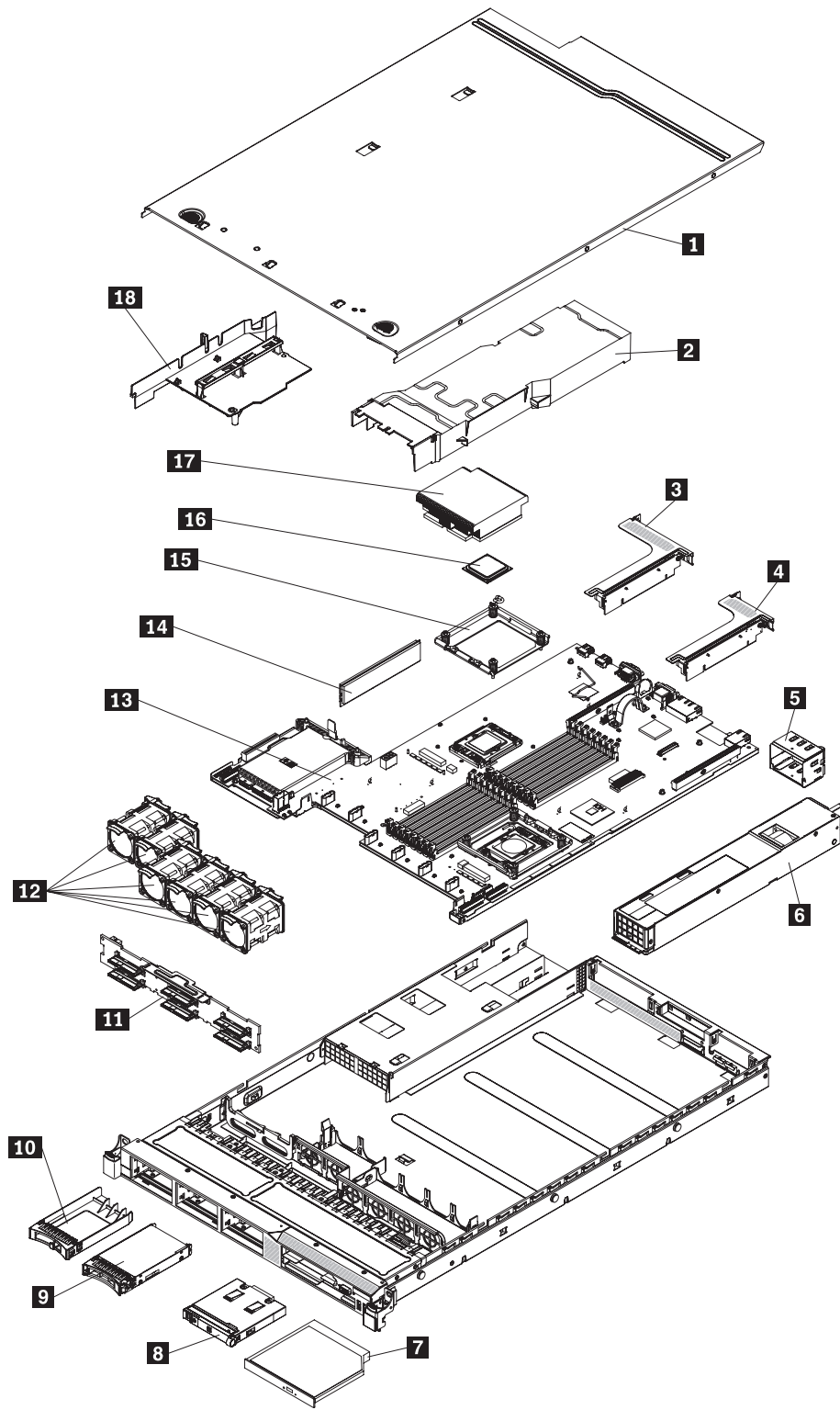
1	Cover	**10**	2.5 inch hot-swap hard disk drive filler panel
2	DIMM air baffle	**11**	SAS/SATA backplane
3	Slot 2, PCI riser card assembly	**12**	Fans
4	Slot 1, PCI riser card assembly	**13**	System board
5	Power supply filler	**14**	Retainer bracket
6	Power supply	**15**	Microprocessor
7	Optical drive	**16**	Heat sink
8	Operator information panel	**17**	Microprocessor 2 air baffle
9	2.5 inch hard disk drive		

Removing and replacing the cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

Removing the cover

To remove the server cover, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see the *Hardware Maintenance Manual* for information on how to solve the problem.

1	Cover
2	Tab
3	Tab

3. If the server has been installed in a rack, slide the server out from the rack enclosure. See the *Rack Installation Instructions* that come with the server for information about removing the server from the rack.

4. Press down firmly on the two blue tabs on the top (near the front of the server) of the cover and slide the cover toward the rear of the server until the cover has disengaged from the chassis.

5. Lift the server cover off the server and set it aside.

Replacing the cover

Attention: For proper cooling and airflow, replace the server cover before you turn on the server.

To replace the server cover, complete the following steps:

1. Align the cover **1** over the server (toward the rear of the server) until the cover edges slip in position over the chassis.

2. Press down on the two blue tabs **2** and **3** on the front of the cover, while sliding the cover forward toward the front of the server until the cover is completely closed.
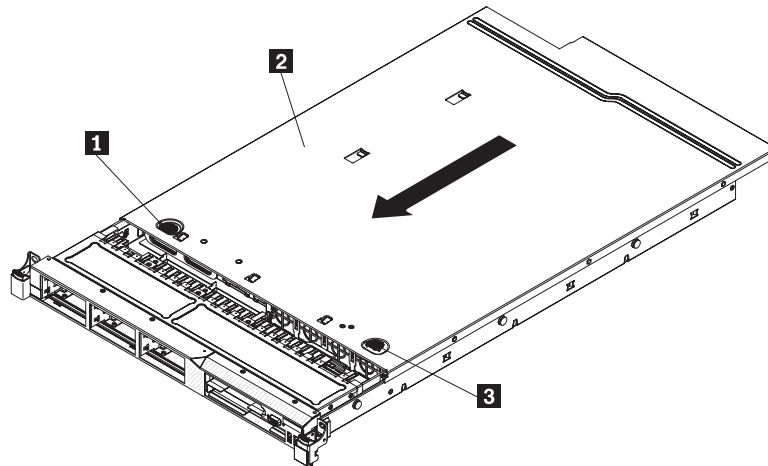
Internal cable routing and connectors

The following illustration shows the internal routing and connectors for the two SAS signal cables (in server models with eight SAS drive bays).

Notes:

1. To connect the SAS signal cables, make sure that you first connect the signal cable, and then the power cable and signal cable.

2. To disconnect the SAS signal cables, make sure that you first disconnect the power cable, and then the signal cable and configuration cable.
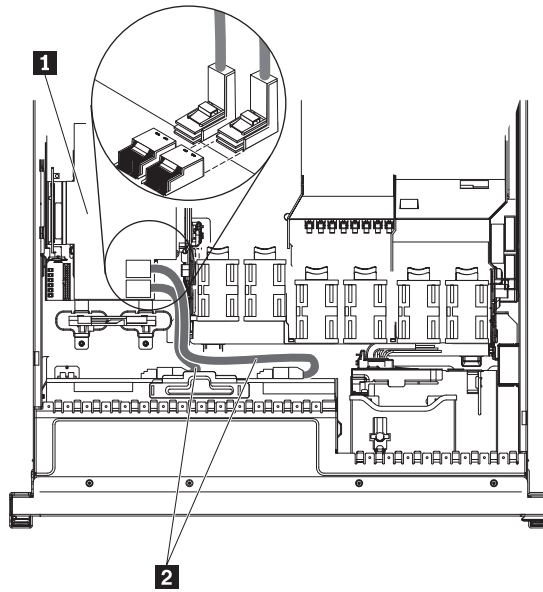
1	ServeRAID™- MR10i SAS/SATA controller
2	SAS signal cables

The SATA cable is a combination power and signal cable with a shared connector on both ends. The following illustration shows the internal routing and connector for the SATA cable **1** .
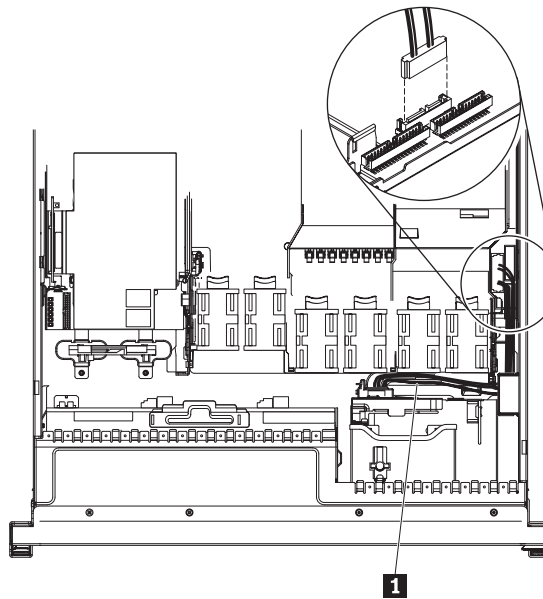
The following illustration shows the internal routing and connector for the operator information panel cable.
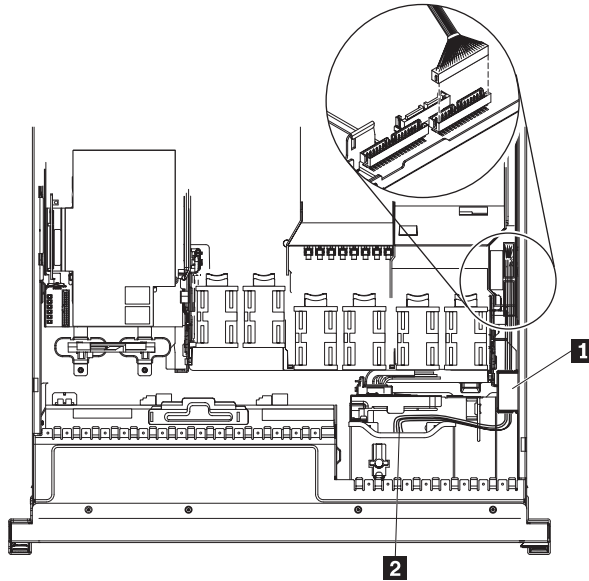
1	Top cover latch receptacle
2	Operator panel cable

The following illustration shows the internal routing and connector for the USB/video cable.

Note: The USB cable is routed under the video cable and then both the USB and video cables are routed under the cable retention tab and the top cover latch receptacle.
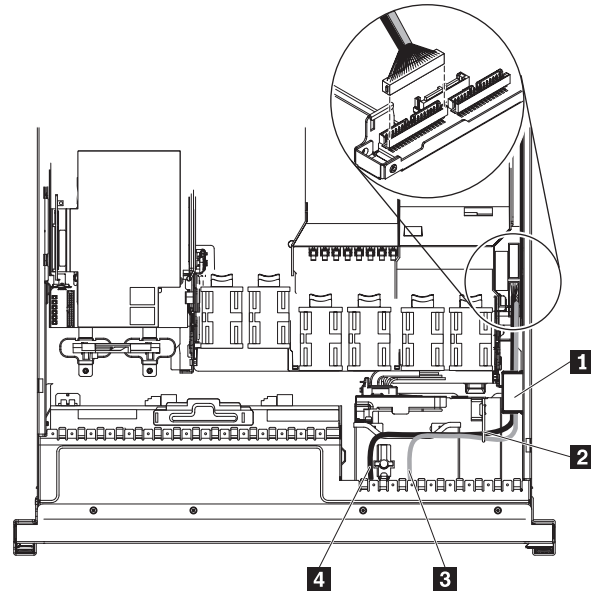
1	Top cover latch receptacle
2	Cable retention tab
3	Video cable
4	USB cable

Removing and installing the microprocessor 2 air baffle

To remove and install the microprocessor 2 air baffle, complete the steps in this section.

Removing the microprocessor 2 air baffle

To remove the microprocessor 2 air baffle, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary; then, remove the cover (see "Removing and replacing the cover" on page 43).
3. Lift the air baffle **2** up, making sure that the tab **1** comes out of the hole **3** on the side of the power-supply cage; then, remove it from the server and set it aside.

    Attention: For proper cooling and airflow, replace the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.
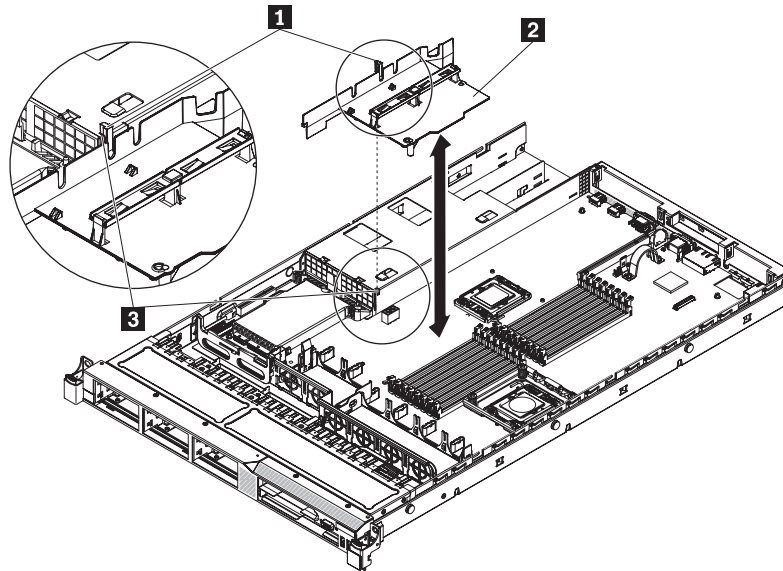
Installing the microprocessor 2 air baffle

To install the microprocessor 2 air baffle (if you removed it), complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Align the microprocessor 2 air baffle tab with the hole on the side of the power-supply cage; then insert the tab into the hole on the cage (make sure that the front end of the air baffle is lined up with the blue press point tab on the left of fan 6). Press the air baffle down until the it is securely seated.
4. Install the cover see "Removing and replacing the cover" on page 43).
5. Reconnect the power cords and any cables that you removed.
6. Turn on the peripheral devices and the server.

Removing and installing the DIMM air baffle

To remove and install the DIMM air baffle, complete the steps in this section.

Removing the DIMM air baffle

To remove the DIMM air baffle, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see the *Hardware Maintenance Manual* for information on how to solve the problem.

3. Grasp the DIMM air baffle **2** and lift the baffle up, making sure that the pin **1** comes out of the pin hole **3** on the system board to the left of DIMM connector 8.
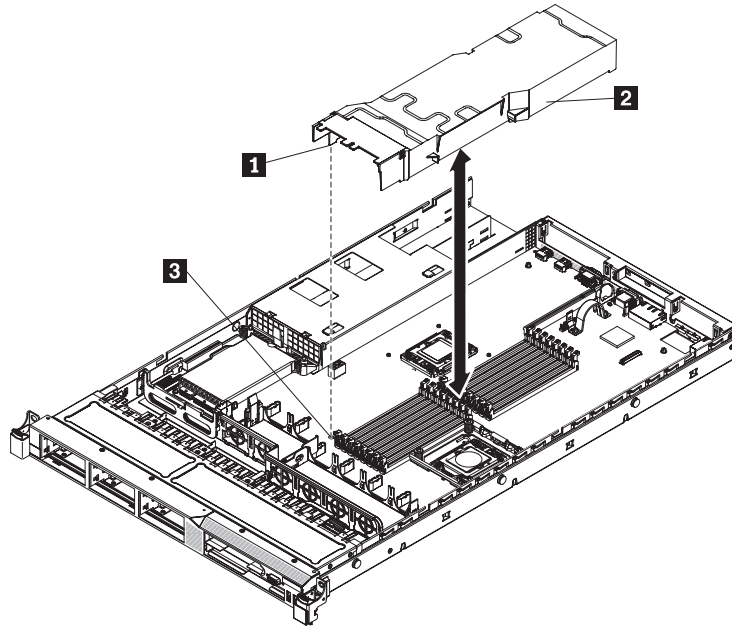
4. Remove it from the server and set it aside.

Installing the DIMM air baffle

Attention: For proper cooling and airflow, replace the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

To install the DIMM air baffle, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Align the DIMM air baffle over the DIMMs so that the baffle pin on the left side of the air baffle aligns with the pin hole next to DIMM connector 8 on the system board and lower it into the server.
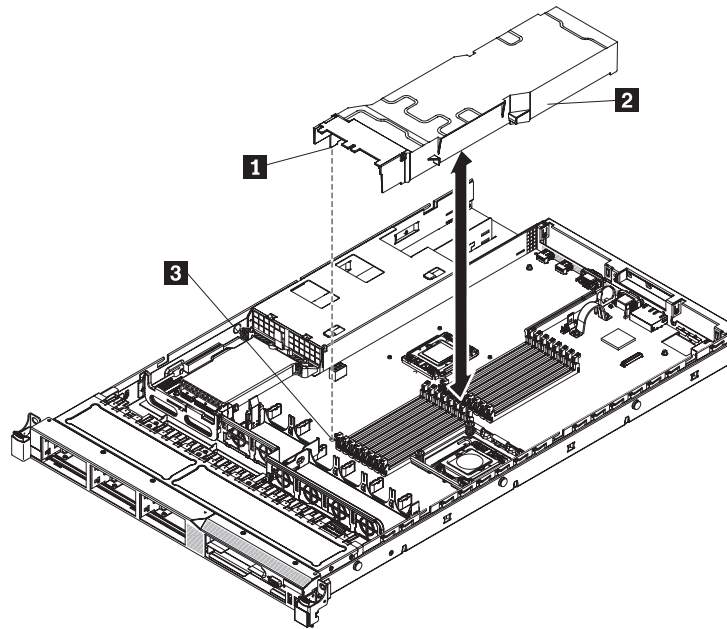
Removing and installing a hot-swap hard disk drive

The following notes describe the type of internal drives that the server supports and other information that you must consider when installing a drive. For a list of supported hard disk drives, go to www.lenovo.com/thinkserver and click on the **Options & Software** tab.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA hard disk drive, be sure to set the SAS or SATA ID for that device.
- The server supports six 2.5-inch hot-swap SAS or hot-swap SATA hard disk drives.
- All hot-swap drives in the server should have the same throughput speed rating. Mixing hard disk drives with different speed ratings will cause all drives to operate at the lower throughput speed.

- Do not mix SAS and SATA hard disk drives in the same system.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, go to www.lenovo.com/thinkserver and click on the **Options & Software** tab.

To remove and install a hot-swap hard disk drive, complete the steps in this section.

Removing a hot-swap hard disk drive

To remove a hot-swap hard disk drive, complete the following steps.

Attention:
- To avoid damage to the hard disk drive connectors, make sure that the server cover is in place and fully closed whenever you install or remove a hard disk drive.
- To make sure that there is adequate system cooling, do not operate the server for more than 2 minutes without either a hard disk drive or a filler panel installed in each bay.
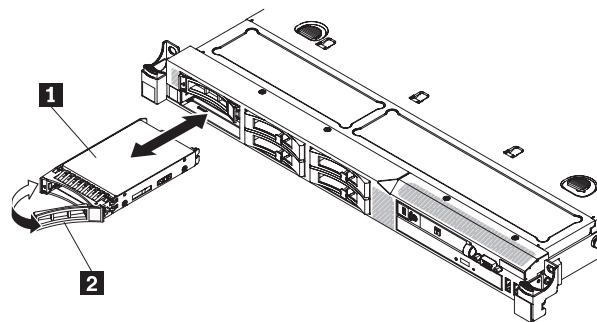
| 1 | Drive-tray assembly |
| 2 | Drive handle |

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Slide the release latch (orange) gently to the left to unlock the drive handle.
3. Grasp the handle and slide the drive out of the drive bay.
4. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap hard disk drive

The following notes describe the type of hard disk drives that the server supports and other information that you must consider when you install a hard disk drive. For a list of supported hard disk drives, see www.lenovo.com/thinkserver.

- Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this chapter.

- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- The server supports six 2.5-inch hot-swap SAS or hot-swap SATA hard disk drives.
- You can mix SAS and SATA hard disk drives in the same server as long as they are not on the same array.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see www.lenovo.com/thinkserver.

To install a 2.5-inch hot-swap SAS or SATA hard disk drive, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Remove the filler panel **1** from the empty drive bay.
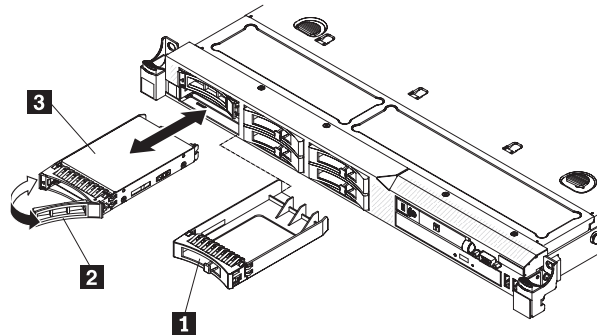
3. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
4. Install the hard disk drive in the drive bay.
   a. Make sure that the tray handle **2** is in the open (unlocked) position.
   b. Align the drive assembly **3** with the guide rails in the bay.
   c. Gently push the drive assembly into the bay until the drive stops.
   d. Rotate the tray handle to the closed (locked) position.
   e. Check the hard disk drive status LED to verify that the hard disk drive is operating correctly. If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

      Note: If the server is configured for RAID operation using a RAID adapter, you might have to reconfigure your disk arrays after you install hard disk drives. See the RAID adapter documentation for additional information about RAID operation and complete instructions for using the RAID adapter.

5. If you are installing additional hot-swap hard disk drives, do so now.
6. Turn on the peripheral devices and the server.

IDs for hot-swap hard disk drives

The hot-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.
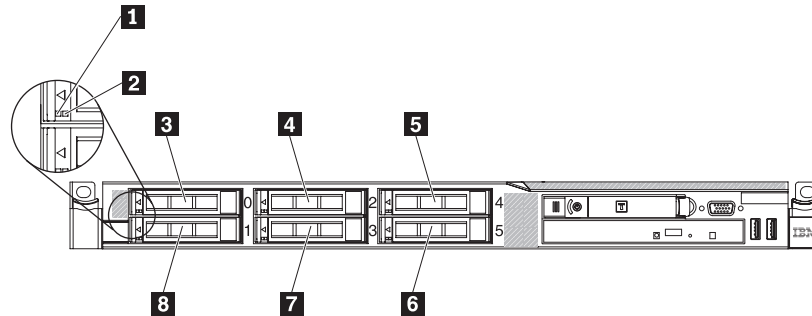
1	Hard disk drive activity LED (green)
2	Hard disk drive status LED (amber)
3	Drive bay 0
4	Drive bay 2
5	Drive bay 4
6	Drive bay 5
7	Drive bay 3
8	Drive bay 1

Removing and installing a PCI riser-card assembly

To remove and install a PCI riser-card assembly, complete the steps in this section.

Removing a PCI riser-card assembly

To remove a PCI riser-card assembly, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see the *Hardware Maintenance Manual* for information on how to solve the problem.

3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. If an adapter is installed in the riser-card assembly, disconnect any cables that are connected to the adapter.
5. Grasp the rear of the riser-card assembly from the rear and lift it out of the PCI riser-card slot on the system board.

1 PCI riser-card assembly (full-height, full-length adapters)
2 PCI riser-card assembly (low-profile adapters)
3 PCI riser connector 1
4 PCI riser connector 2

6. Remove the adapter, if one is present, from the riser-card assembly.
7. Set the adapter and riser-card assembly aside.

Installing a PCI riser card assembly

To install a PCI riser-card assembly, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Install the adapter in the new PCI riser-card assembly.
5. Set any jumpers or switches on the adapter as directed by the adapter manufacturer.
6. Align the PCI riser-card assembly with the PCI slot connector on the system board: then, press down firmly until the riser-card assembly in seated correctly in the connector on the system board.
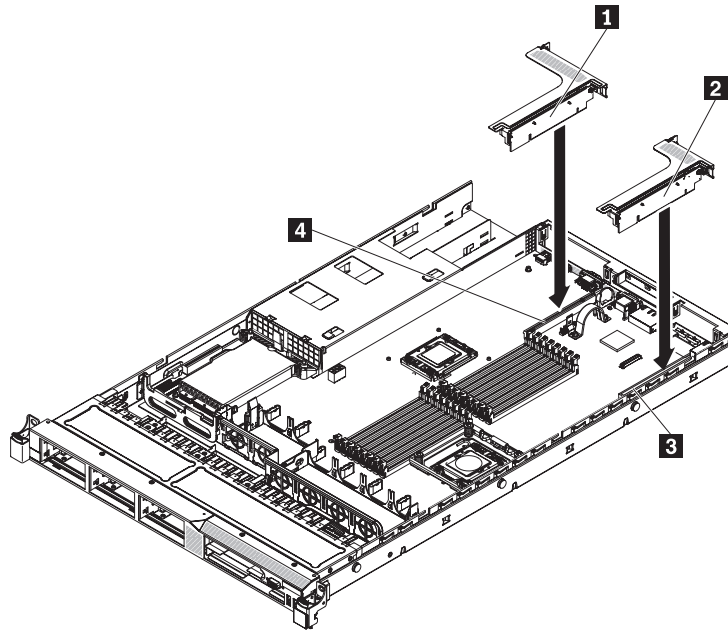
1 PCI riser-card assembly (full-height, full-length adapters)
2 PCI riser-card assembly (low-profile adapters)
3 PCI riser connector 1
**4** PCI riser connector 2

Removing and installing an adapter

The following describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section.

- The server provides two PCI riser slots on the system board. Each slot comes with a PCI riser assembly with a bracket installed. The following information indicates the riser card slots and the type of adapters that the riser cards support:

  - Standard models of the server comes with two PCI Express riser-card assemblies installed.

  - A PCI Express riser card assembly has a black connector and supports PCI Express adapters.

  - PCI riser slot 1 (this slot is the farthest slot away from the power supplies). This slot supports only low-profile adapters.

  - PCI riser slot 2 (this slot is the closest slot to the power supplies). This slot supports only full-height, half-length adapters.

- Do no set the maximum digital video adapter resolution above 1600 x 1200 at 60 Hz for an LCD monitor. This is the highest resolution that is supported for any add-on video adapter that you install in the server.

- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported.

- The server does not support full-length adapters.

- When you install any PCI adapter, the power cords must be connected form the power source before you remove the PCI Express riser-card assembly.

Otherwise, the active power management event signal will be disabled by the system-board logic, and the WAN feature might not work. However, after the server is powered on locally, the active power manager active power management event signal will be enabled by the system-board logic.

- If you switch the PCI adapter from slot 1 riser assembly to slot 2, you will need to remove the screw from the standard bracket and then replace the standard bracket with the low-profile bracket.
- The server provides two PCI riser-card slots
- To install any PCI adapter, both the AC and DC power cords must be disconnected from the power source before you remove the PCI Express riser assembly. Otherwise, this will cause the active power management event signal to become disabled by hardware. However, after the server is powered-on locally, the active power manager active power management event signal will be enabled by hardware.

Removing an adapter

To remove an adapter, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing and replacing the cover" on page 43).
3. Disconnect any cables from the adapter.
4. Grasp the riser-card assembly at the rear edge and lift to remove the riser-card assembly.
5. Place the riser-card assembly on a flat, static-protective surface.
6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the riser-card assembly.
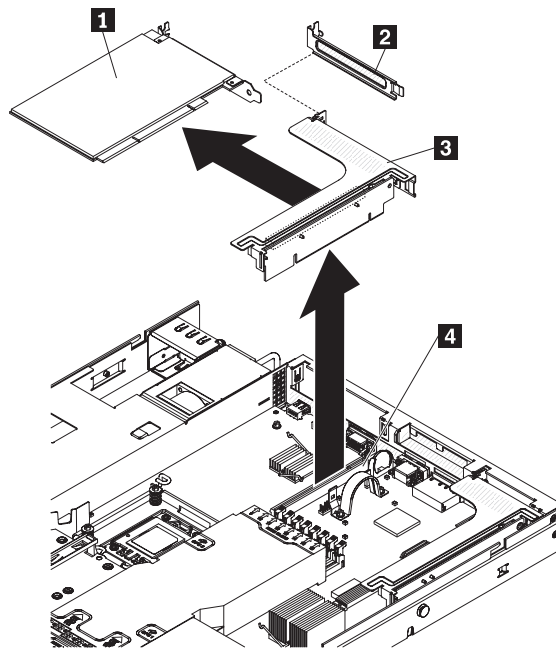
1 Adapter
2 Expansion slot cover
3 PCI riser-card assembly
4 PCI riser-card connector

7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an adapter

To install an adapter, complete the following steps:

Notes:

1. The instructions in this section apply to any PCI adapter (for example, video graphics adapters or network adapters).

2. Do not set the maximum digital video adapter resolution above 1600 x 1200 at 60 Hz for an LCD monitor. This is the highest resolution that is supported for any add-on video adapter that you install in the server.

3. Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables; then, remove the server cover (see "Removing and replacing the cover" on page 43).

3. Follow the cabling instructions, if any come with the adapter. Route the adapter cables before you install the adapter.

4. Insert the adapter into the riser-card assembly, aligning the edge connector on the adapter with the connector on the riser-card assembly. Press the edge of the connector *firmly* into the riser-card assembly. Make sure that the adapter snaps into the riser-card assembly securely.

   Attention: When you install an adapter, make sure that the adapter is correctly seated in the riser-card assembly and that the riser-card assembly is securely seated in the riser-card connector on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.
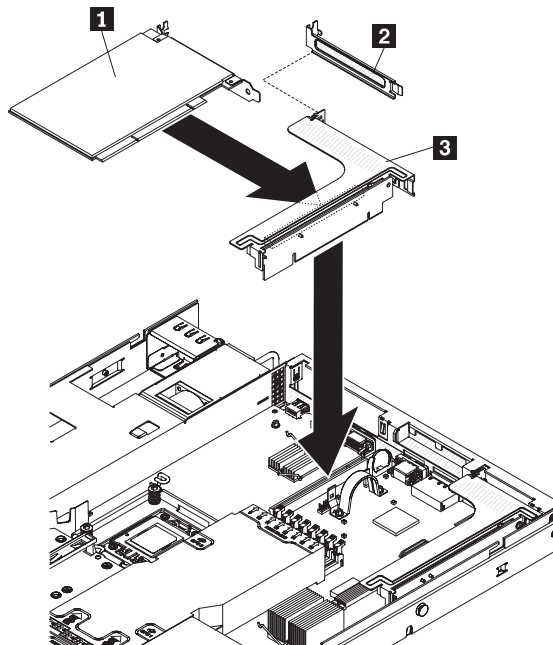
1	Adapter
2	Expansion slot cover
3	PCI riser card assembly

5. Install the riser-card assembly in the server (see "Removing and installing a PCI riser-card assembly" on page 53).

6. Perform any configuration tasks that are required for the adapter.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 111.

Removing and installing a memory module (DIMMs)

To remove and install a memory module, complete the steps in this section.

Removing a memory module (DIMMs)

To remove a dual inline memory module (DIMM), complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Disconnect any cables that impede access to the DIMMs.
5. Remove the DIMM air baffle (see "Removing and installing the DIMM air baffle" on page 48).
6. Carefully open the retaining clips **2** on each end of the DIMM connector and remove the DIMM **1** .

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
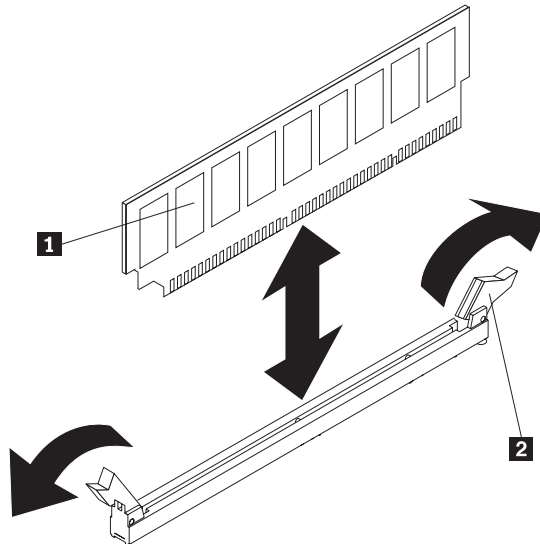
7. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module (DIMMs)

The following notes describe the types of DIMMs that the server supports and other information that you must consider when you install DIMMs :

- The server supports only industry-standard double-data-rate 3 (DDR3), 800, 1066, or 1333 MHz, PC3-10600R-999 (single-rank or dual-rank), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC).
  - The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

    ggg *e*Rx*ff*-PC3-*wwwwwm-aa-bb-cc*

    where:

    ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

    e is the number of ranks

        1 = single-rank

        2 = dual-rank

        4 = quad-rank

    ff is the device organization (bit width)

        4 = x4 organization (4 DQ lines per SDRAM)

        8 = x8 organization

        16 = x16 organization

    wwwww is the DIMM bandwidth, in MBps

        6400 = 6.40 GBps (PC3-800 SDRAMs, 8-byte primary data bus)

        8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

        10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

        12800 = 12.80 GBps PC3-1600 SDRAMs, 8-byte primary data bus)

    m is the DIMM type

        E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

        R = Registered DIMM (RDIMM)

        U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

    aa is the CAS latency, in clocks at maximum operating frequency

    bb is the JEDEC SPD Revision Encoding and Additions level

    cc is the reference design file for the design of the DIMM

    d is the revision number of the reference design of the DIMM
- The server supports a maximum of 16 single-rank or dual-rank DIMMs.

  Note: To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).
- The server supports three single-rank or dual-rank DIMMs per channel. The following table shows an example of the maximum amount of memory that you can install using ranked DIMMs:

Table 6. Maximum memory installation using ranked DIMMs

Number of DIMMs	DIMM type	DIMM size	Total memory
16	Single-rank DIMMs	4 GB	64 GB
16	Dual-rank DIMMs	4 GB	64 GB
16	Dual-rank DIMMs	8 GB (if available)	128 GB

- The DIMM options that are available for the server are 1 GB, 2 GB, 4 GB, and 8 GB (when available). The sever supports a minimum of 1 GB and a maximum of 128 GB of system memory.

  Note: The amount of usable memory is reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility.
- A minimum of one DIMM must be installed for each microprocessor. For example, you must install a minimum of two DIMMs if the server has two microprocessors installed. However, to improve system performance, install a minimum of three DIMMs for each microprocessor.
- The maximum operating speed of the server is determined by the slowest DIMM installed in the server.

DIMM installation sequence
- The server comes with a minimum of two 1 GB DIMMs, installed in connectors 3 and 6. When you install additional DIMMs, install them in the order shown in the following table to optimize system performance. In non-mirroring mode, all three channels on the memory interface for each microprocessor can be populated in any order and have no matching requirements.

Table 7. Non-mirroring (normal) mode DIMM installation sequence

Installed microprocessors	DIMM connector population sequence
Microprocessor socket 1	3, 6, 8, 2, 5, 7, 1, 4
Microprocessor socket 2	11, 14, 16, 10, 13, 15, 9, 12

Memory mirroring
- The server supports memory mirroring (mirroring mode):
  – Memory-mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs. To enable memory mirroring through the Setup utility, select **System Settings → Memory**. When you use the memory mirroring feature, consider the following information:
    - When you use memory mirroring, you must install a pair of DIMMs at a time. One DIMM must be in channel 0, and the mirroring DIMM must be in the same slot in channel 1. The two DIMMs in each pair must be identical in size, type, and rank (single or dual) , and organization, but not in speed. The channels run at the speed of the slowest DIMM in any of the channels.
    - Channel 2, DIMM connectors 8 ,7, 15, and 16 are not used in memory-mirroring mode.
    - The maximum available memory is reduced to half of the installed memory when memory mirroring is enabled. For example, if you install 64 GB of memory, only 32 GB of addressable memory is available when you use memory mirroring.

  The following diagram shows the memory channel interface layout with the DIMM installation sequence for mirroring mode. The numbers within boxes indicate the DIMM population sequence in pairs within the channels, and the numbers next to the boxes indicate the DIMM connectors within the channels. For example, the following illustration shows the first pair of DIMMs (indicated by ones (1) inside the boxes) should be installed in DIMM connectors 3 on channel 0 and DIMM connector 6 on channel 1 DIMM connectors 7, 8, 15, and 16 on channel 2 are

not used in memory-mirroring mode.

```
 1    2    3  CH0              CH0  6    5    4
   3    2    1                       9   10   11
                CPU1    CPU2
 1    2    3  CH1   QPI        CH1  6    5    4
   6    5    4                      12   13   14
                CH2              CH2
        8    7                      15   16
```
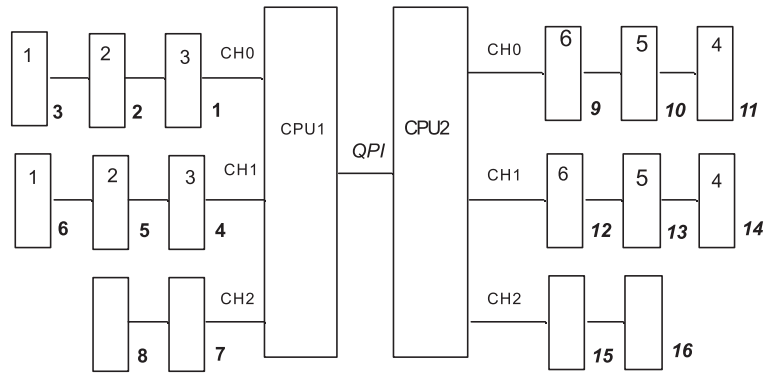
The following table lists the DIMM connectors on each memory channel.

Table 8. Connectors on each memory channel

Memory channel	DIMM connectors
Channel 0	1, 2, 3, 9, 10, 11
Channel 1	4, 5, 6, 12, 13, 14
Channel 2	7, 8, 15, 16

The following illustration shows the memory connector layout that is associated with each microprocessor. For example, DIMM connectors 9, 10, 11, 12, 13, 14, 15, and 16 (DIMM connectors are shown underneath the boxes) are associated with microprocessor 2 slot (CPU2) and DIMM connectors 1, 2, 3, 4, 5, 6, 7, and 8 are associated with microprocessor 1 slot (CPU1). The numbers within the boxes indicates the installation sequence of the DIMM pairs. For example, the first DIMM pair (indicated within the boxes by ones (1)) should be installed in DIMM connectors 3 and 6, which is associated with microprocessor 1 (CPU1).

Note: You can install DIMMs for microprocessor 2 as soon as you install microprocessor 2; you do not have to wait until all of the DIMM slots for microprocessor 1 are filled.

```
CPU2    6   5   4   6   5   4
        9  10  11  12  13  14  15  16

                1   2   3   1   2   3   CPU1
        8   7   6   5   4   3   2   1
```
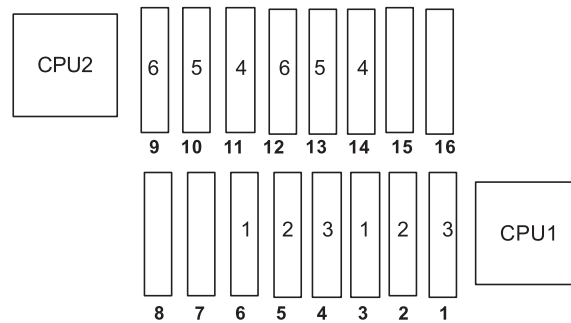
The following table shows the installation sequence for installing DIMMs in memory-mirroring mode:

Table 9. Memory-mirroring mode DIMM population sequence

DIMMs	Number of installed microprocessors	DIMM connector
First pair of DIMMs	1	3, 6
Second pair of DIMMs	1	2, 5

Table 9. Memory-mirroring mode DIMM population sequence (continued)

DIMMs	Number of installed microprocessors	DIMM connector
Third pair of DIMMs	1	1, 4
Fourth pair of DIMMs	2	14, 11
Fifth pair of DIMMs	2	13, 10
Sixth pair of DIMMs	2	12, 9
Note: DIMM connectors 7, 8, 15, and 16 are not used in memory-mirroring mode.		

- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

The following illustration shows the location of the DIMMs connectors on the system board.
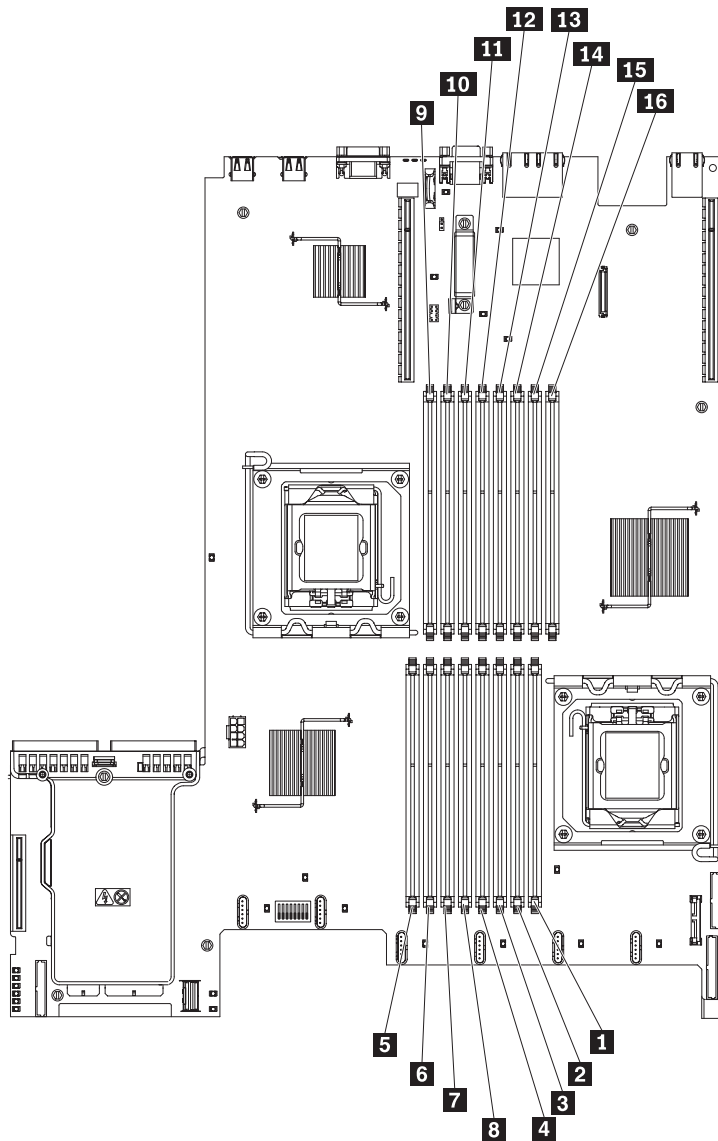
1	DIMM 1 connector		10	DIMM 10 connector
2	DIMM 2 connector		11	DIMM 11 connector
3	DIMM 3 connector		12	DIMM 12 connector
4	DIMM 4 connector		13	DIMM 13 connector
5	DIMM 8 connector		14	DIMM 14 connector
6	DIMM 7 connector		15	DIMM 15 connector
7	DIMM 6 connector		16	DIMM 16 connector
8	DIMM 5 connector			
9	DIMM 9 connector			

Installation steps

To install a DIMM, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Disconnect any cables that impede access to the DIMMs.
5. Remove the DIMM air baffle (see "Removing and installing the DIMM air baffle" on page 48).
6. Carefully open the retaining clips **2** on each end of the DIMM connector and remove the DIMM **1** .

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
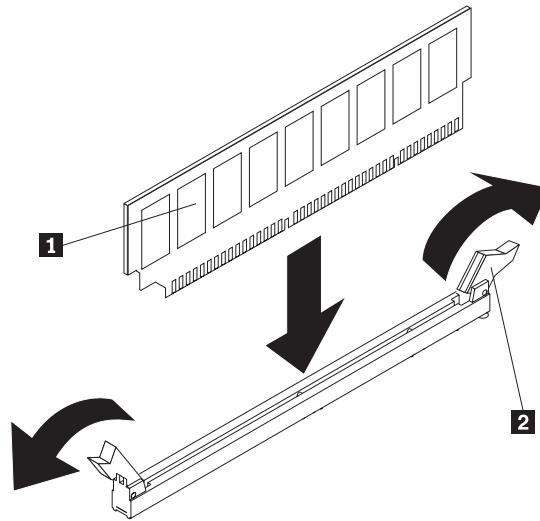
7. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
8. Turn the DIMM so that the DIMM keys align correctly with the connector.
9. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.
10. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

11. Reconnect the power cord and any cables that you removed.

12. Replace the cover (see "Removing and replacing the cover" on page 43).

13. Turn on the peripheral devices and the server.

Removing and installing the IBM ServeRAID-BR10i SAS/SATA Controller

To remove and install the IBM ServeRAID-BR10i SAS/SATA Controller, complete the steps in this section.

Removing the IBM ServeRAID-BR10i SAS/SATA Controller

To remove the IBM ServeRAID-BR10i SAS/SATA controller from the system board, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect the power cords.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see "EasyLED" on page 157 for information on how to solve the problem.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Disconnect the signal cables that are attached to the drive backplane from the connectors on the controller.

5. Grasp the SAS/SATA controller near the end next to the power-supply cage and press the black plastic tab (next to the power supply) that is holding the controller in place toward the power supply.

6. Pull up on the SAS/SATA controller until the RAID riser card assembly disengages from the connector on the system board.
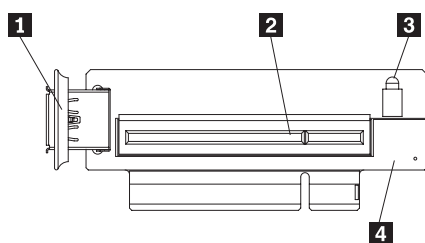
1	USB embedded connector
2	RAID controller connector
3	Riser card error LED
4	SAS/SATA RAID riser card

7. Grasp the SAS/SATA controller and pull it out of the connector on the RAID riser card assembly.
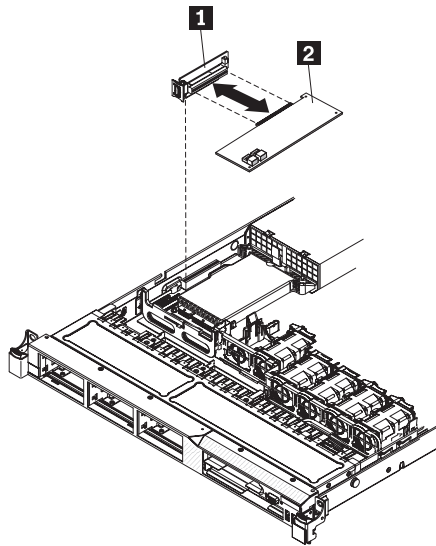
1	SAS/SATA riser card
2	ServeRAID-BR10i controller

8. If you are instructed to return the SAS/SATA controller, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the IBM ServeRAID-BR10i SAS/SATA Controller

Some server models come with the IBM ServeRAID-BR10i SAS/SATA Controller installed. The adapter can be installed only in the dedicated slot on the SAS/SATA RAID riser card assembly on the system board (see "System-board internal connectors" on page 27 for the location of the connector). Use the connector on the SAS/SATA RAID riser card assembly for the RAID controllers. The IBM ServeRAID-BR10i SAS/SATA controller enables integrated RAID levels 0, 1, and 1E capability on hot-swap hard disk drives. To install the adapter if your server model did not come with this adapter installed, complete the following steps to install the IBM ServeRAID-BR10i SAS/SATA Controller:

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see the "EasyLED" on page 157 for information on how to solve the problem.
3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Touch the static-protective package that contains the new ServeRAID-BR10i SAS/SATA controller to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the controller and remove it from the package.

5. Align the ServeRAID-BR10i SAS/SATA controller so that the keys align correctly with the connector on the SAS/SATA RAID riser card assembly.
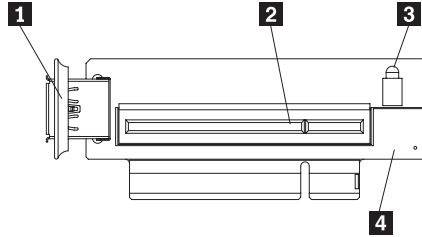
1 USB embedded connector
2 RAID controller connector
3 Riser card error LED
4 SAS/SATA RAID riser card

6. Insert the SAS/SATA controller **2** into the connector on the SAS/SATA RAID riser card assembly **1** until it is firmly seated.

   Attention: Incomplete insertion might cause damage to the server or the controller.
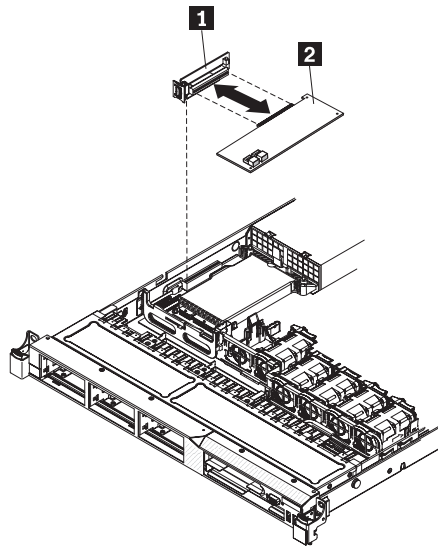
7. Tilt the SAS/SATA RAID riser-card assembly slightly and insert the end of the adapter in the slot on the retention bracket as shown in the following illustration. Make sure that the SAS/SATA RAID riser-card assembly keys align correctly with the connector on the system board and press down on the assembly until it is seated firmly into the connector on the system board.
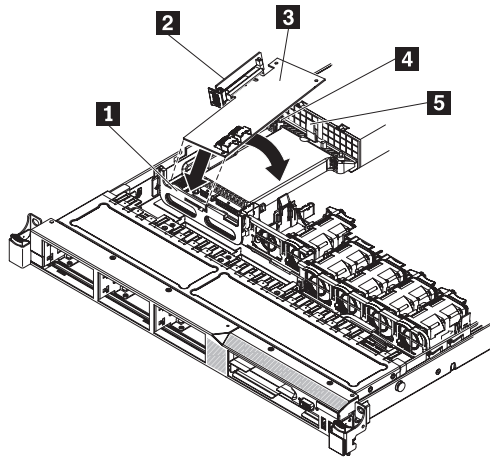
1	SAS/SATA RAID front retention bracket
2	SAS/SATA RAID riser card
3	ServeRAID-BR10i adapter
4	Alignment post
5	Plastic tab

8. Route the signal cables from the drive backplane over the blue adapter retention bracket as shown in the following illustration.
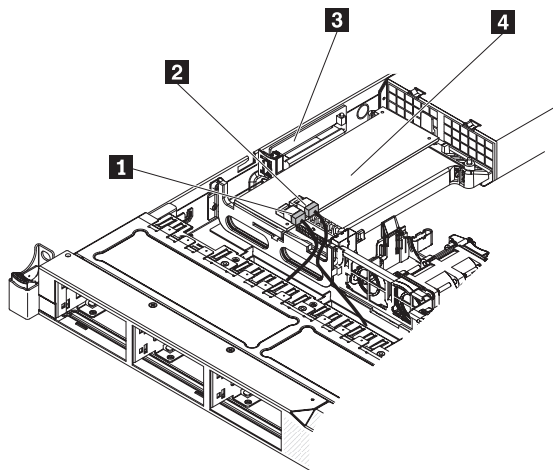
1	Connector for drive bays 0-3 signal cable
2	Connector for drive bays 4-5 signal cable
3	SAS/SATA RAID riser-card
4	ServeRAID-BR10i adapter

9. Take the signal cable that is attached to the drive backplane for drive bays 4 and 5 and connect it to the RAID controller connector that is closest to the power supply cage. Connect the other signal cable so that is attached to the drive backplane for drive bays 0 through 3 and connect it to the other connector on the controller. The following illustration show how to route the signal cables.

   Note: When you restart the server, you will be prompted to import the existing RAID configuration to the new ServeRAID controller.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 111.

Removing and installing the optional IBM ServeRAID-MR10i SAS/SATA Controller

To remove and install the optional IBM ServeRAID-MR10i SAS/SATA Controller, complete the steps in this section.

Removing the optional IBM ServeRAID-MR10i SAS/SATA Controller

To remove the IBM ServeRAID-MR10i SAS/SATA controller, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see "EasyLED" on page 157 for information on how to solve the problem.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Disconnect the signal cables that are attached to the existing SAS/SATA controller from the connectors on the controller.
5. Grasp the SAS/SATA controller near the end next to the power-supply cage and press the black plastic tab (next to the power supply) that is holding the controller in place toward the power supply.
6. Pull up on the SAS/SATA controller until the RAID riser card assembly disengages from the connector on the system board.
7. Grasp the SAS/SATA controller and pull it out of the connector on the RAID riser card assembly.
8. If you are instructed to return the SAS/SATA controller, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the optional IBM ServeRAID-MR10i SAS/SATA Controller

An optional IBM ServeRAID-MR10i SAS/SATA controller can also be purchased. It can be installed only in the dedicated slot on the SAS/SATA RAID riser card assembly on the system board (see "System-board internal connectors" on page 27 for the location of the connector). Use the connector on the SAS/SATA RAID riser card assembly to install the RAID controllers.

To install the IBM ServeRAID-MR10i SAS/SATA controller, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source

removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see the "EasyLED" on page 157 for information on how to solve the problem.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Touch the static-protective package that contains the new ServeRAID-MR10i SAS/SATA controller to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the controller and remove it from the package.

5. Align the ServeRAID-MR10i SAS/SATA controller so that the keys align correctly with the connector on the SAS/SATA RAID riser card assembly.

6. Insert the SAS/SATA adapter into the connector on the SAS/SATA RAID riser-card until it is firmly seated.

   Attention: Incomplete insertion might cause damage to the server or the adapter.
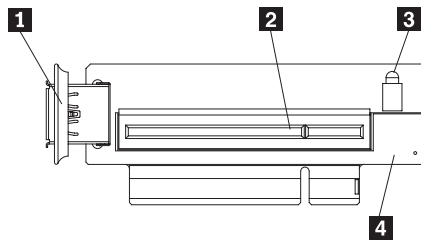
1	USB embedded connector
2	RAID adapter connector
3	Riser card error LED
4	SAS/SATA RAID riser card
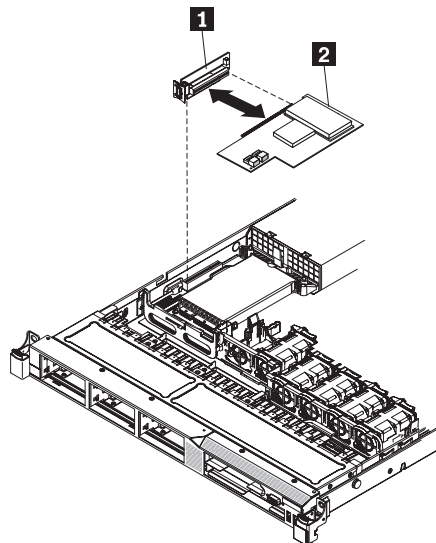
| **1** | SAS/SATA RAID riser-card |
| **2** | ServeRAID-MR10i adapter |

7. Tilt the SAS/SATA RAID riser-card assembly slightly and insert the end of the adapter in the slot on the retention bracket as shown in the following illustration. Make sure that the SAS/SATA RAID riser-card assembly keys align correctly

with the connector on the system board and press down on the assembly until it is seated firmly into the connector on the system board.
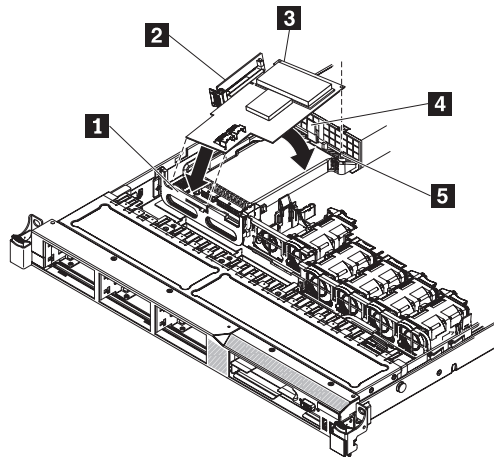
1	SAS/SATA RAID front retention bracket
2	SAS/SATA RAID riser card
3	ServeRAID-MR10i adapter
4	Plastic tab
5	Alignment post

8. Route the signal cables from the drive backplane over the blue adapter retention bracket as shown in the following illustration.
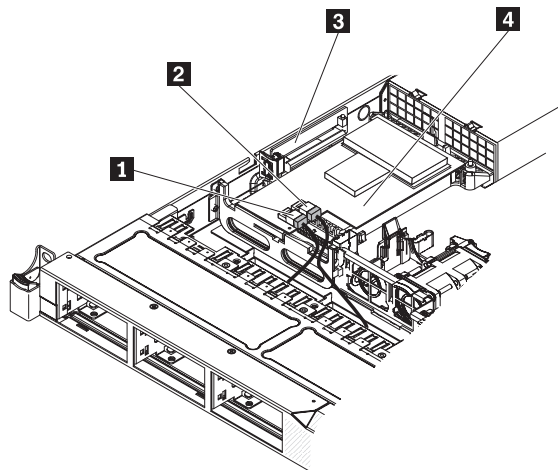
1	Connector for drive bays 0-3 signal cable
2	Connector for drive bays 4-5 signal cable
3	SAS/SATA RAID riser card
4	ServeRAID-MR10i controller

9. Take the signal cable that is attached to the drive backplane for drive bays 4 and 5 and connect it to the RAID controller connector that is closest to the power supply cage. Connect the other signal cable so that is attached to the drive backplane for drive bays 0 through 3 and connect it to the other connector on the controller. The following illustration show how to route the signal cables.

   Note: When you restart the server, you will be prompted to import the existing RAID configuration to the new RAID controller.

Removing and installing a microprocessor and heat sink

To remove and install a microprocessor and heat sink, follow the instructions in this section.

Removing a microprocessor and heat sink

Attention:

- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.
- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

To remove a microprocessor and heat sink, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Disconnect any cables that impede access to the heat sink and microprocessor.
5. Open the heat sink release lever to the fully open position.
6. Lift the heat sink out of the server. After removal, place the heat sink on its side on a clean, flat surface.
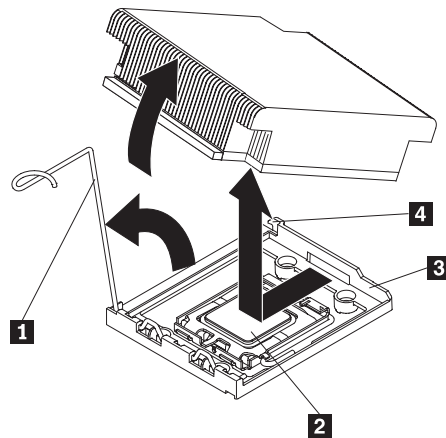
1	Heat sink release lever
2	Microprocessor
3	Retainer bracket
4	Lock tab

7. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and releasing it to the open (up) position.
8. Open the microprocessor bracket frame by lifting up the tab on the top edge. Keep the bracket frame in the open position.
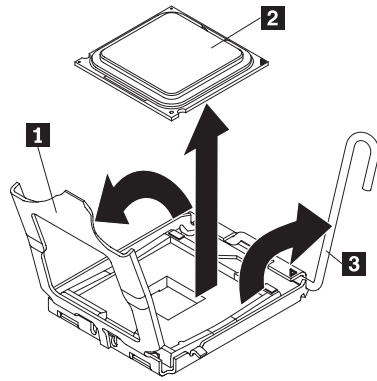
1	Microprocessor bracket frame
2	Microprocessor
3	Microprocessor release lever

9. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.

10. If you are instructed to return the microprocessor, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a microprocessor and heat sink

The following notes describe the type of microprocessor that the server supports and other information that you must consider when you install a microprocessor and heat sink:

- The server supports up to two Intel Xeon™ dual-core or quad-core microprocessors. See http://www.lenovo.com/thinkserver for a list of supported microprocessors.

- Do not mix dual-core and quad-core microprocessors in the same server.

- The upgrade of microprocessors are not supported on this server. For example, if the server came with a 2.0 GHz microprocessor, you cannot upgrade the microprocessor to a 2.3 GHz microprocessor, it is not supported.

- The first microprocessor must always be installed in microprocessor socket 1 on the system board.

- When one microprocessor is installed, a heat sink filler is not required for microprocessor socket 2, however, the microprocessor 2 air baffle and the DIMM air baffle must be installed to provide proper system cooling.

- Do not remove the first microprocessor from the system board when you install the second microprocessor.

- When you install the second microprocessor, you must also install additional memory.

- To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same QuickPath Interconnect (QPI) link speed, integrated memory controller frequency, core frequency, power segment, internal cache size, and type.

- Mixing microprocessors of different stepping levels within the same server model is supported.

- When mixing microprocessors with different stepping levels within the same server model, you do not have to install the microprocessor with lowest stepping level and features in microprocessor socket 1.

- Both microprocessor voltage regulator modules are integrated on the system board.
- If you have to replace a microprocessor, call for service.
- Read the documentation that comes with the microprocessor, so that you can determine whether you have to update the server firmware. To download the latest level of server firmware and other code updates for your server, complete the following steps:

  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. From **Family** list, select **ThinkServer RD210**, and click **Continue**.
  4. Click **Downloads and drivers** to download firmware updates.

- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink. For more information about applying or working with thermal grease, see "Thermal grease" on page 75.

  Note: Removing the heat sink from the microprocessor destroys the even distribution of the thermal grease and requires replacing the thermal grease.

- To order an additional optional microprocessor, contact your marketing representative or authorized reseller.

To install an additional microprocessor and heat sink, complete the following steps:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 41.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Install the microprocessor:

   a. Press down and out on the release lever on microprocessor socket and lift up the microprocessor release lever until it stops in the fully open position.

   b. Lift the hinged microprocessor bracket frame into an open position and remove the microprocessor dust cover, tape, or label from the surface of the microprocessor socket, if one is present. Store the dust cover in a safe place.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 41.

   c. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

Attention:

- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
- Handle the microprocessor carefully. Dropping the microprocessor during installation or removal can damage the contacts.
- Do not use excessive force when you press the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned and positioned in the socket before you try to close the lever.

d. Align the microprocessor with the socket (note the alignment mark and the position of the notches); then, carefully place the microprocessor on the socket and close the microprocessor bracket frame.

Note: The microprocessor fits only one way on the socket.
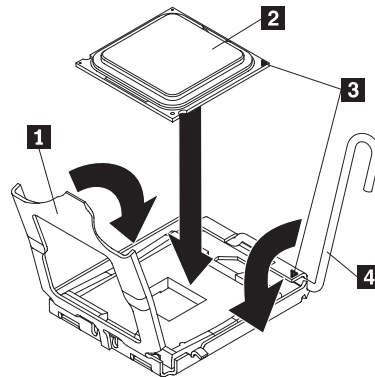
1	Microprocessor bracket frame
2	Microprocessor
3	Alignment marks
4	Microprocessor release level

e. Carefully close the microprocessor release lever to the closed position to secure the microprocessor in the socket.

3. Install the heat sink:

a. Clean the grease from the heat sink and apply new grease on the microprocessor.

b. Align the heat sink on top of the microprocessor.

c. Lower the rear flange of the heat-sink into the opening in the retainer bracket and press down firmly on the front of the heat-sink until it is seated securely.
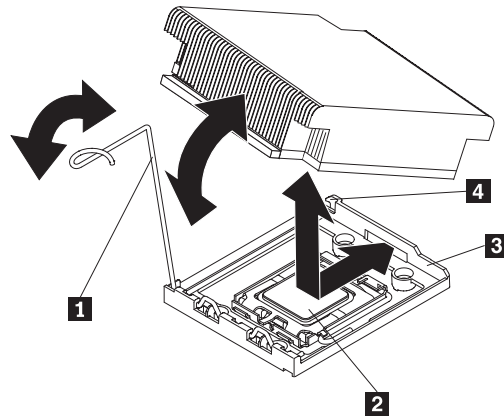
1	Heat sink release lever
2	Lock tab
3	Retainer bracket
4	Microprocessor

    d. Rotate the heat-sink release lever to the closed position and hook it underneath the lock tab.

4. If you removed the microprocessor 2 air baffle, install it (see "Removing and installing the microprocessor 2 air baffle" on page 47).

Thermal grease

The thermal grease must be replaced whenever the heat sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

When you are installing the heat sink on the same microprocessor that is was removed from, make sure that:

- The thermal grease on the heat sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the heat sink and microprocessor.

Note:

- Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

1. Place the heat sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

   Note: Make sure that all of the thermal grease is removed.

4. Use a clean area of the cleaning pad to wipe the thermal grease **1** from the microprocessor **2** ; then, dispose of the cleaning pad after all of the thermal grease is removed.
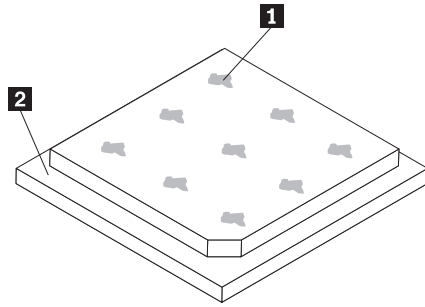
5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge of the microprocessor, this is to ensure uniform distribution of the grease.
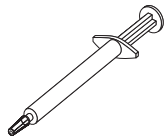
   Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 111.

Removing and installing a hot-swap power supply

This procedure is used when either installing an optional hot-swap power supply or replacing a defective power supply. The removal procedure is used only when replacing a power supply.

This procedure applies only to server models that have hot-swap power supplies. When you remove or install a hot-swap power supply, observe the following precautions.

- The server comes with one 675-watt hot-swap 12-volt output power supply. The input voltage is 110 V ac or 220 V ac auto-sensing.
- You can install an optional 675-watt hot-swap 12-volt output power supply for redundancy.
- These power supplies are designed for parallel operation. In the event of a power-supply failure, the redundant power supply continues to power the system. The server supports a maximum of two power supplies.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2 🔲 ➡ ▭▬▬
1 🔲 ➡ ▭▬▬
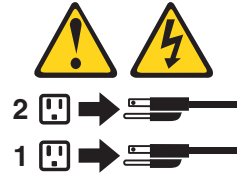
Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Removing a hot-swap power supply

To remove a hot-swap power supply, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. If only one power supply is installed, turn off the server and peripheral devices and disconnect all power cords.

3. If the server is in a rack, at the back of the server, pull back the cable-management arm to gain access to the rear of the server and the power supply **1** .

4. Press and hold the release tab **2** to the left. Grasp the handle and pull the power supply out of the server.
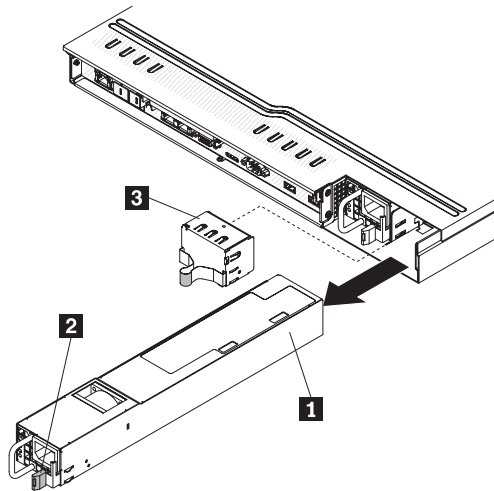
5. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

6. If you are replacing a defective power supply, continue to "Installing a hot-swap power supply."

Installing a hot-swap power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when installing a power supply:

To install a hot-swap power supply, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Touch the static-protective package that contains the hot-swap power supply **2** to any unpainted metal surface on the server; then, remove the power supply **2** from the package and place it on a static-protective surface.

3. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler panel **3** from the power-supply bay.
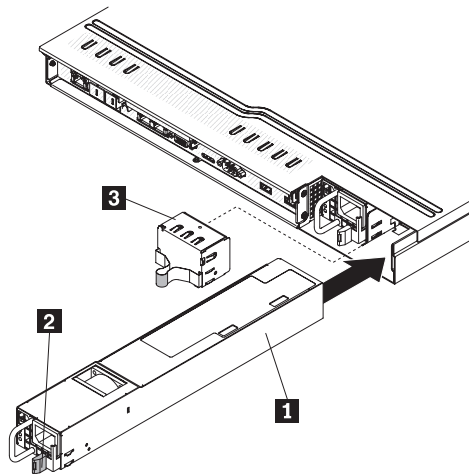
4. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply backplane.

5. Route the power cord through the handle so that it does not accidentally become unplugged.

6. Connect the power cord for the new power supply to the power-cord connector on the power supply.

7. Connect the other end of the power cord to a properly grounded electrical outlet.

8. Make sure that the ac power LED and the dc power LED on the power supply are lit, indicating that the power supply is operating correctly. The two green LEDs are to the right of the power-cord connector.

Removing and installing a hot-swap fan assembly

The server supports up to six hot-swap cooling fans.

Removing a hot-swap fan assembly

Attention: To ensure proper server operation, replace a failed fan within 30 seconds.

To remove a hot-swap-fan, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Remove the cover (see "Removing and replacing the cover" on page 43). The LED near the connector of the failing fan assembly is lit.

3. Disconnect the cable of the failing fan from the connector.
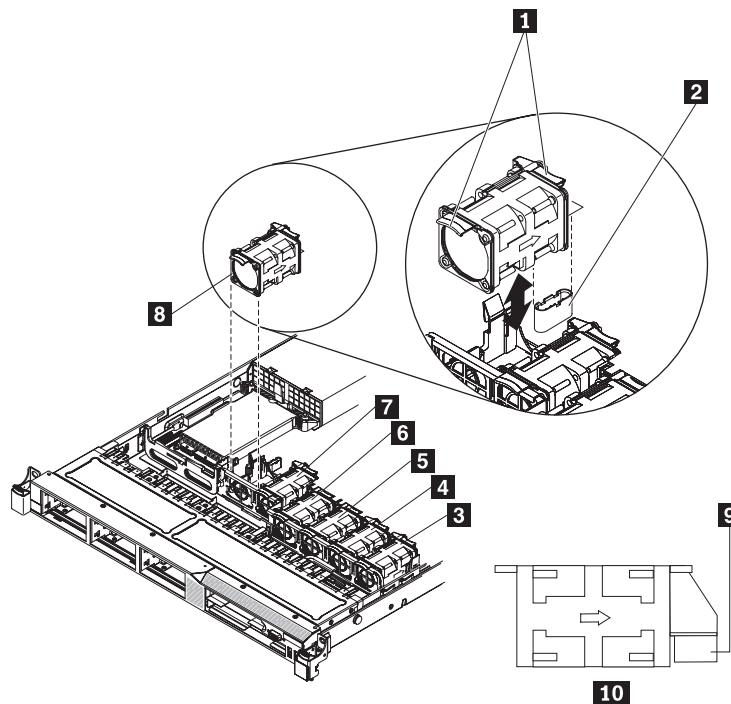
1	Fan tabs	**6**	Fan 4
2	Fan connector on the system board	**7**	Fan 5
3	Fan 1	**8**	Fan 6
4	Fan 2	**9**	Fan connector
5	Fan 3	**10**	Fan (side view)

4. Grasp the orange fan tabs on both ends of the fan and pull it up out of the server. If you are removing fans 3 and 4, you need to first remove the DIMM air baffle (see "Removing and installing the DIMM air baffle" on page 48).
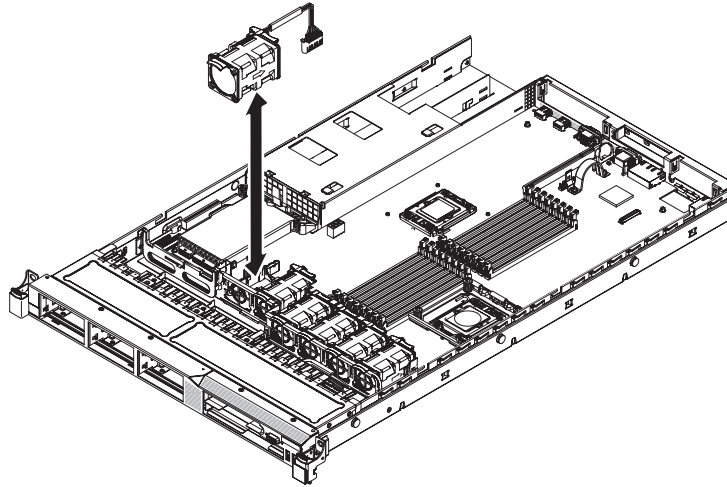
**Attention:** To ensure proper operation, replace a failed fan as soon as possible.

5. If you are instructed to return the fan, follow all of the packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap fan assembly

To install an additional hot-swap fan, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Remove the cover (see "Removing and replacing the cover" on page 43).
3. Touch the static-protective package that contains the new fan to any unpainted metal surface on the server. Then, remove the new fan from the package.
4. If you are replacing a fan, grasp the orange fan tabs **1** on both ends of the existing fan and pull it up out of the server. If you are replacing fans 3 and 4, you will need to remove the DIMM air baffle first (see "Removing and installing the DIMM air baffle" on page 48).
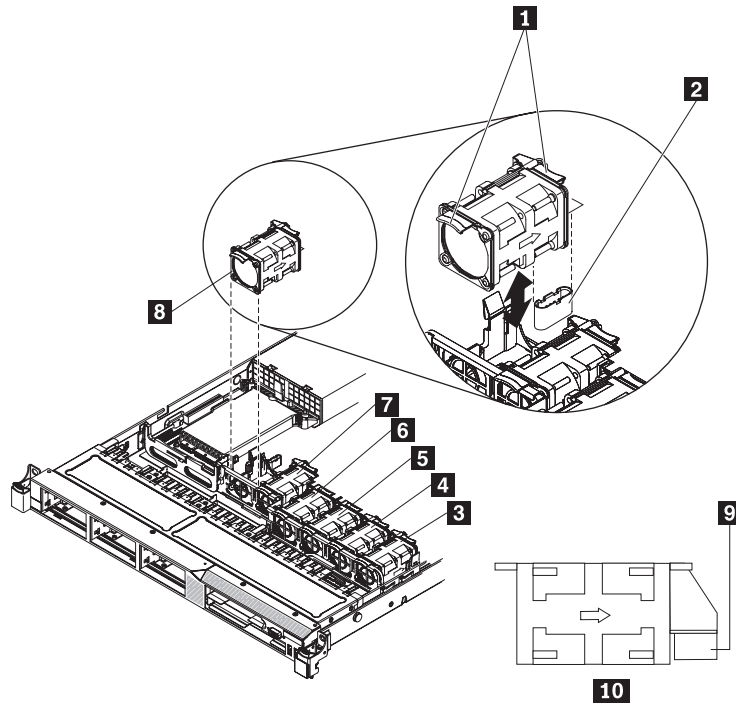
1	Fan tabs	**6**	Fan 4
2	Fan connector on the system board	**7**	Fan 5
3	Fan 1	**8**	Fan 6
4	Fan 2	**9**	Fan connector
5	Fan 3	**10**	Fan (side view)

Attention: To ensure proper operation, replace a failed fan as soon as possible.

5. Orient the new fan over the fan slot in the fan assembly bracket so that the fan cable connector aligns with the fan connector on the system board.
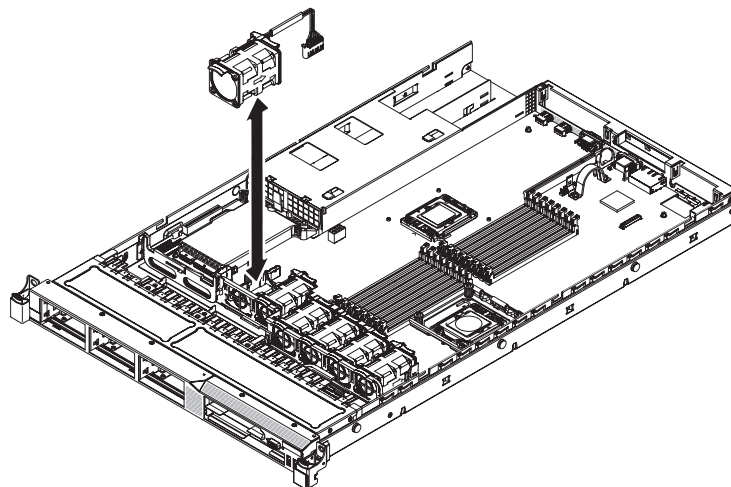
6. Insert the fan into the fan slot in the fan assembly bracket and press it down until it is seated correctly in the slot and the fan cable is seated correctly in the fan connector on the system board.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 111.

Removing and installing the SAS/SATA RAID riser-card assembly

To remove and install the SAS/SATA RAID riser-card assembly, complete the steps in this section.

Removing the SAS/SATA RAID riser-card assembly

To remove the SAS/SATA RAID riser-card assembly, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing and replacing the cover" on page 43).

3. Disconnect the cables from the connectors on the SAS/SATA controller; then, grasp the controller and pull it out of the connector on the RAID riser-card assembly.

4. Remove the flash device from the SAS/SATA RAID riser card **1** , if one is installed.
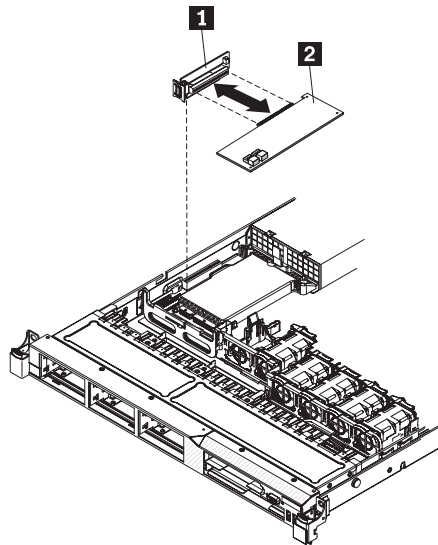
1   SAS/SATA riser card
2   ServeRAID-BR10i controller

5. If you are instructed to return the RAID riser-card assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the SAS/SATA RAID riser-card assembly

To install the SAS/SATA RAID riser-card assembly, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables; then, remove the server cover (see "Removing and replacing the cover" on page 43).

3. Reinstall the SAS/SATA adapter, if one was removed.

4. Reinstall the flash device, if it was removed.

5. Align the SAS/SATA RAID riser-card assembly keys correctly with the connector on the system board and press down on the assembly until it is seated firmly into the connector on the system board.

6. Connect the signal cables to the SAS/SATA adapter.
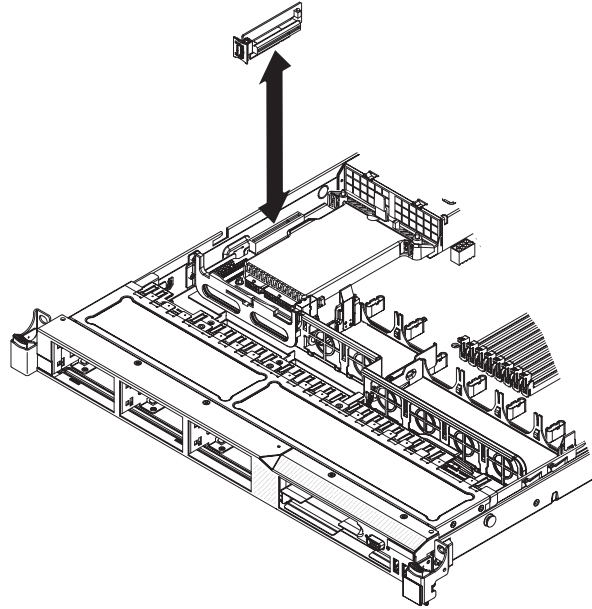
7. Install the cover.

8. Slide the server into the rack.

9. Reconnect the power cord and any cables that you removed.

10. Turn on the peripheral devices and the server.

Removing and installing the battery

To remove and install the battery, complete the steps in this section.

Removing the battery

To remove the system-board battery, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing and replacing the cover" on page 43).

3. If necessary, lift the riser-card assembly out of the way (see "Removing and installing a PCI riser-card assembly" on page 53).

4. Locate the battery **1** on the system board.
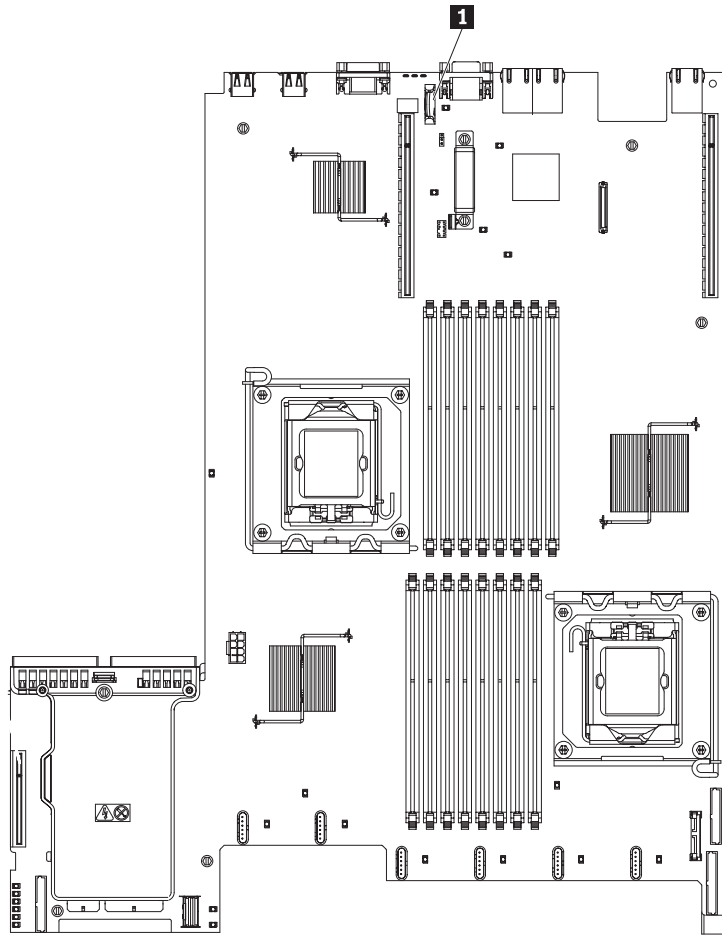
5. Remove the system-board battery:

   a. Use one finger to push the battery horizontally out of its housing.
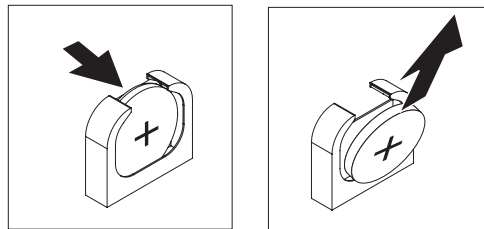
   b. Use your thumb and index finger to lift the battery from the socket.

6. Dispose of the battery as required by local ordinances or regulations. See the *Safety and Warranty Guide* for more information.

Installing the battery

The following notes describe information that you must consider when replacing the system-board battery in the server.

- When replacing the system-board battery, you must replace it with a lithium battery of the same type from the same manufacturer.
- After you replace the system-board battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:

CAUTION:
When replacing the lithium battery, use only an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

To install the replacement system-board battery, complete the following steps:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:

   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
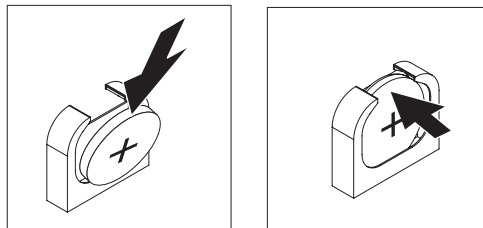
   b. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.
3. Install the cover (see "Removing and replacing the cover" on page 43).
4. Slide the server into the rack.
5. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.
6. Start the UEFI Setup Utility program and reset the configuration.
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

   See "Using the Setup Utility" on page 116 for details.

Removing and installing the PCI riser-card assembly

To remove and install the PCI riser-card assembly, complete the steps in this section.

Removing the PCI riser-card assembly

To remove a PCI riser-card assembly, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.

   Note: When you disconnect the power source from the server, you will lose the ability to view the LEDs because the LEDs will not be lit with the power source removed. Before disconnecting the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, the EasyLED panel, and LEDs that are lit inside the server on the system board; then, see "EasyLED" on page 157 for information on how to solve the problem.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. If an adapter is installed in the riser-card assembly, disconnect any cables that are connected to the adapter.

5. Grasp the rear of the riser-card assembly from the rear and lift it out of the PCI riser-card slot on the system board.

1	PCI riser-card assembly (full-height, full-length adapters)
2	PCI riser-card assembly (low-profile adapters)
3	PCI riser connector 1
4	PCI riser connector 2

6. Remove the adapter, if one is present, from the riser-card assembly.

7. Set the adapter and riser-card assembly aside.

Installing the PCI riser-card assembly

To replace a PCI riser-card assembly, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Install the adapter in the new PCI riser-card assembly (see "Removing and installing a PCI riser-card assembly" on page 53).

5. Set any jumpers or switches on the adapter as directed by the adapter manufacturer.

6. Align the PCI riser-card assembly with the PCI slot connector on the system board: then, press down firmly until the riser-card assembly in seated correctly in the connector on the system board.
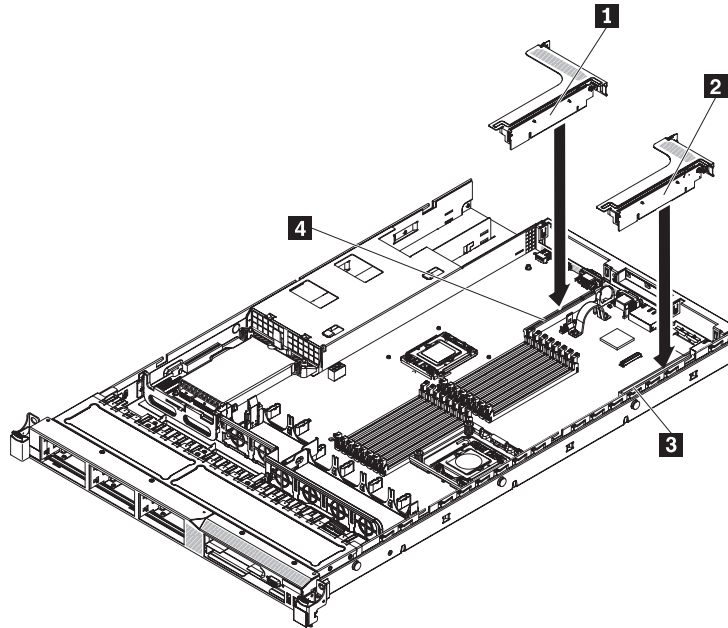
1	PCI riser-card assembly (full-height, full-length adapters)
2	PCI riser-card assembly (low-profile adapters)
3	PCI riser connector 1
4	PCI riser connector 2

Removing and installing the hot-swap SAS/SATA hard disk drive backplane

To remove and install the hot-swap SAS/SATA hard disk drive backplane, complete the steps in this section.

Removing the hot-swap SAS/SATA hard disk drive backplane

To remove the hot-swap SAS/SATA hard disk drive backplane, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Pull the hard disk drives out of the server slightly to disengage them from the backplane.

5. Disconnect the power cable from the power backplane.
6. Disconnect the signal cable from the system board.
7. Lift up to remove the backplane from the slots.
8. Push backwards on the backplane until it is clear of the slots.
9. Lift the backplane out of the server.
10. Disconnect the power cable and the signal cable from the disk drive backplane.
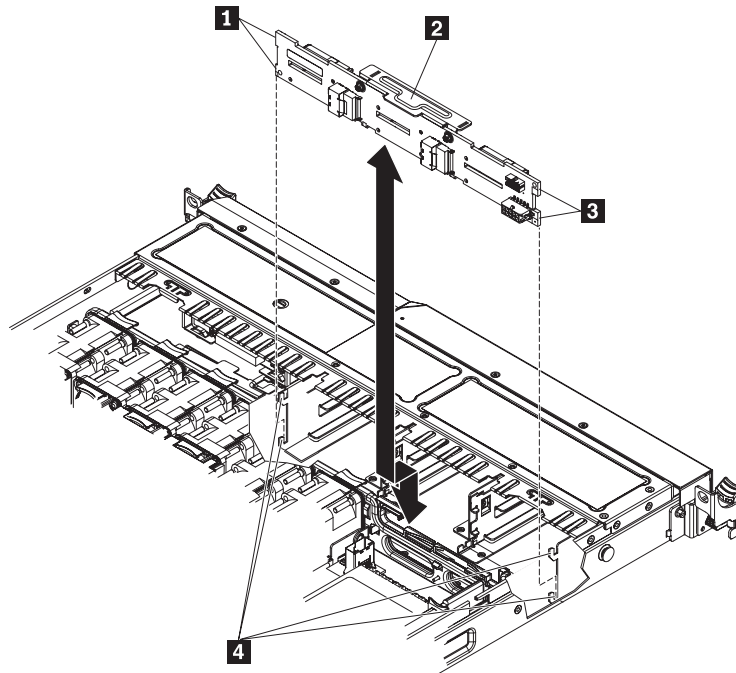
1	Backplane tabs
2	Hard disk drive backplane
3	Backplane tabs
4	Backplane bracket slots

11. If you are instructed to return the backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hot-swap SAS/SATA hard disk drive backplane

To install the replacement hot-swap SAS/SATA hard disk drive backplane, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Connect the power cable and signal cable to the replacement backplane.
3. Insert the backplane into the drive cage.
4. Align the tabs on the backplane with the slots on the left and right brackets.
5. Push down firmly until the backplane is fully seated and the locking tabs snaps into place.
6. Reconnect the power cable and the signal cable from the disk drive backplane.
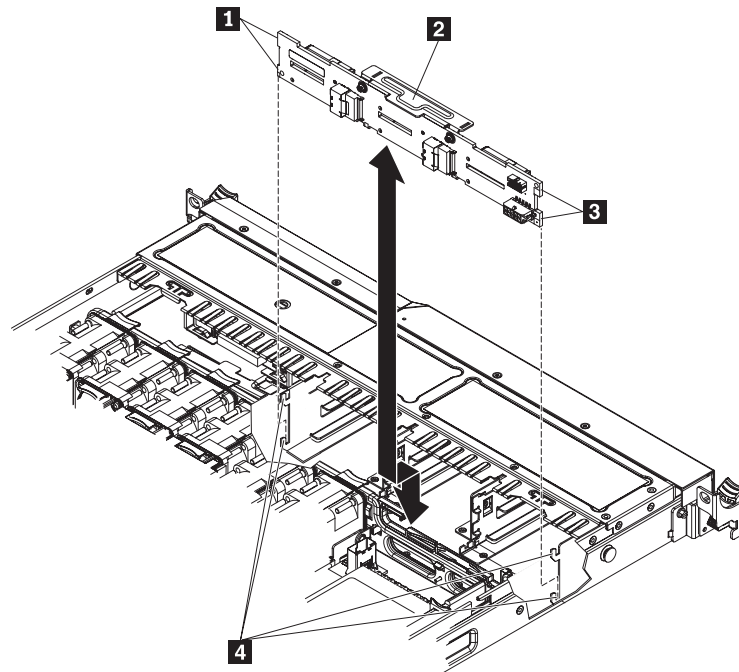
1	Backplane tabs
2	Hard disk drive backplane
3	Backplane tabs
4	Backplane bracket slots

7. Install the cover (see "Removing and replacing the cover" on page 43).
8. Replace the hard disk drives.
9. Slide the server into the rack.
10. Reconnect the power cords and any cables that were removed.
11. Turn on the peripheral devices and the server.

Removing and installing the operator information panel assembly

To remove and install the operator information panel assembly, complete the steps in this section.

Removing the operator information panel assembly

To remove the operator information panel, complete the following steps.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing and replacing the cover" on page 43).
3. Disconnect the cable from the back of the operator information panel assembly **1** .
4. Push the blue release latch **2** to the left until it unlatches.
5. Reach inside the server and push the assembly toward the front of the server.
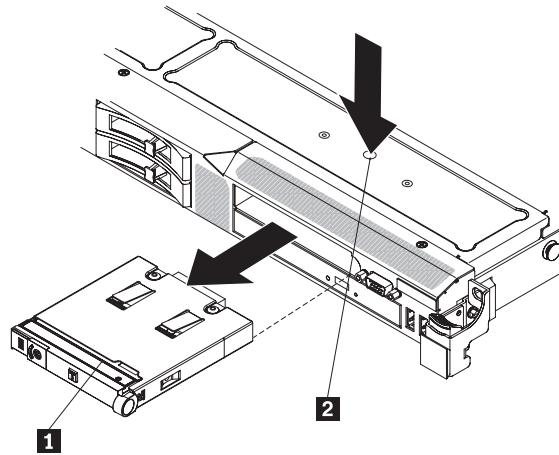
6. From the front of the server, carefully pull the assembly out of the server while moving it slightly side to side.

7. If you are instructed to return the operator information panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the operator information panel assembly

To install the operator information panel, complete the following steps.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. From the front of the server, slide the operator information panel **1** into the server until it clicks into place.

3. Inside the server, connect the cable to the rear of the operator information panel assembly.
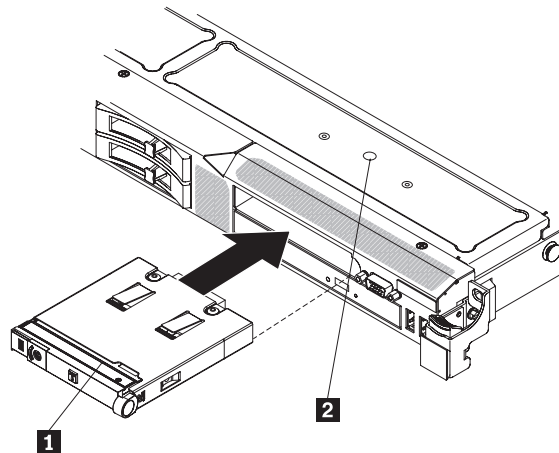
The following illustration shows the cable routing for the operator information panel:

Note: The operation information panel cable should go in between the Video/USB cable (on the bottom) and the CD/DVD cable (on the top) when all three cables are installed in the server.
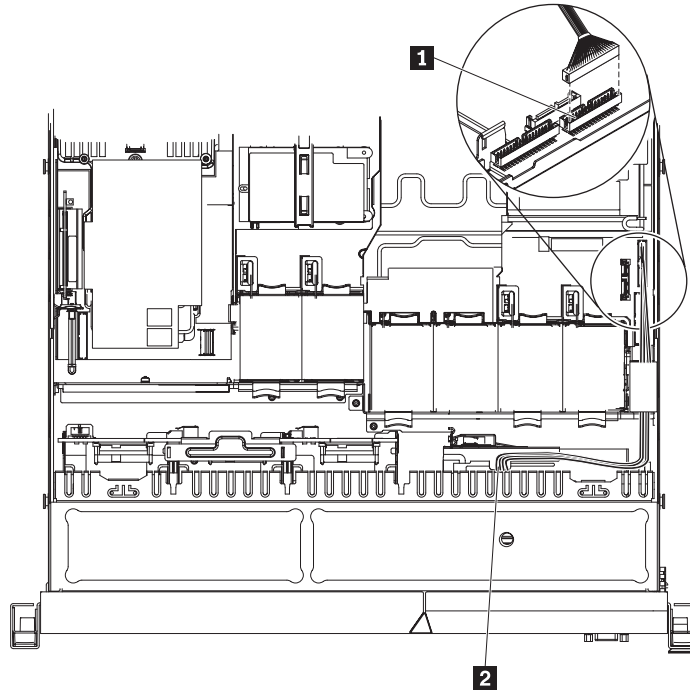
| 1 | Operator information panel connector |
| 2 | Operator information panel cable |

4. Install the cover (see "Removing and replacing the cover" on page 43).
5. Slide the server into the rack.
6. Reconnect the power cords and any cables that were removed.
7. Turn on the peripheral devices and the server.

Removing and installing the system board

To remove and install the system board, complete the steps in this section.

Removing the system board

To remove the system board, complete the following steps.

Notes:

1. When you replace the system board, make sure that you remove IMM Premium and place it on the new system board. For information about the location of the key, see "System-board optional-device connectors" on page 29.

2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing and replacing the cover" on page 43).

   Note: When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer

provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.

3. Remove all PCI riser-card assemblies and adapters (see "Removing and installing the SAS/SATA RAID riser-card assembly" on page 82).

4. Remove the SAS/SATA RAID riser-card assembly and then remove the base (see "Removing and installing the SAS/SATA RAID riser-card assembly" on page 82).

5. Remove the microprocessor 2 and DIMM air baffles from the system board (see "Removing and installing the microprocessor 2 air baffle" on page 47 and "Removing and installing the DIMM air baffle" on page 48).

6. Remove all heat sinks and microprocessors, and set them aside on a static-protective surface for reinstallation.

7. Remove the memory modules and set them aside on a static-protective surface for reinstallation (see "Removing and installing a memory module (DIMMs)" on page 58).

   Note: Make a note of the location of each DIMM as you remove it, so that you can later reinstall it in the same connector.

8. Remove IMM Premium from the system board and set it aside. You will have to install IMM Premium on the new system board.

9. Disconnect all cables from the system board. Make a list of each cable as you disconnect it; you can then use this as a checklist when you install the new system board.

10. Remove the hot-swap fans (see "Removing and installing a hot-swap fan assembly" on page 79).

11. Press the fan brackets release latches (one is to the left of fan 6 and one is to the right of fan 1) inward toward the fans and rotate the fan assembly brackets up toward the front of the server.
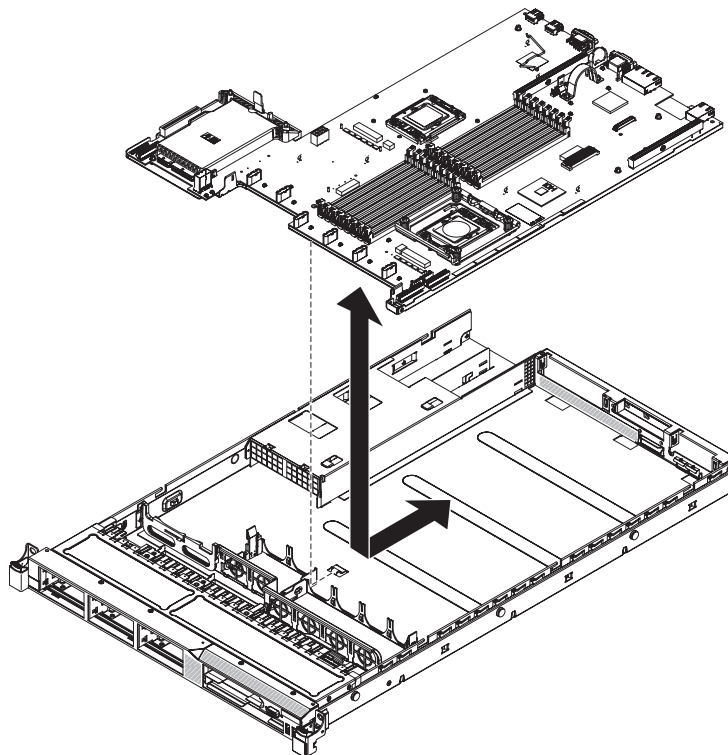
12. Lift up the system board and carefully remove it from the server, being careful not to damage any surrounding components.

13. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system board

Notes:

1. When reassembling the components in the server, be sure to route all cables carefully so that they are not exposed to excessive pressure.

2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code

To install the system board, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Grasp the fan assembly brackets and rotate them down toward the chassis.
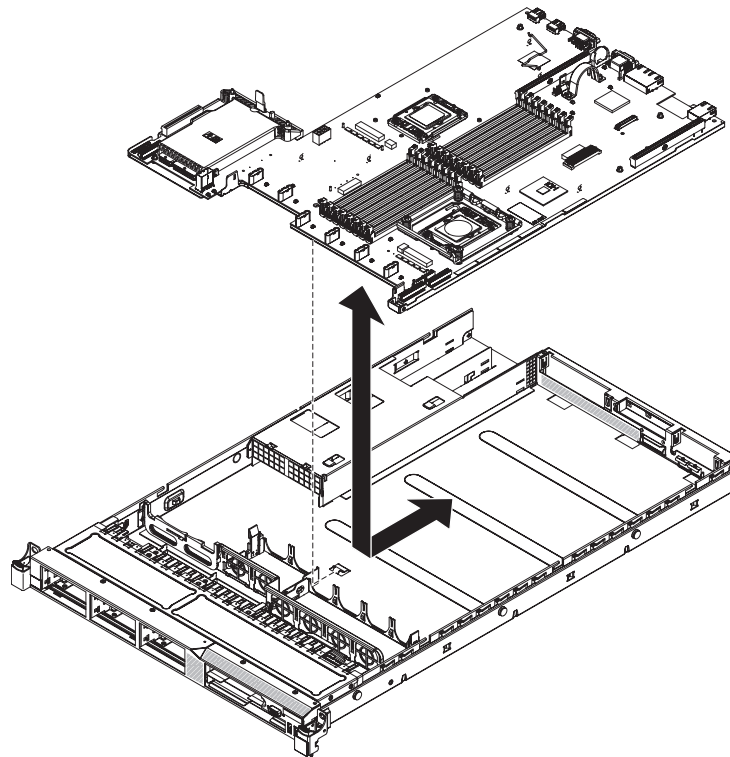
3. Grasp the fan assembly brackets and rotate them down toward the chassis.

4. Reinstall the hot-swap fans (see "Removing and installing a hot-swap fan assembly" on page 79).

5. Reinstall the microprocessor and heat sink.

6. Reinstall the SAS/SATA RAID riser-card assembly base (see "Removing and installing the SAS/SATA RAID riser-card assembly" on page 82).

7. Reinstall the DIMMs (see "Removing and installing the DIMM air baffle" on page 48).
8. Reinstall the microprocessor 2 and DIMM air baffles (see "Removing and installing the microprocessor 2 air baffle" on page 47 and "Removing and installing the DIMM air baffle" on page 48).
9. Reinstall the PCI riser-card assemblies and adapters, if any were installed (see "Removing and installing the SAS/SATA RAID riser-card assembly" on page 82).
10. Reinstall IMM Premium (see "Removing and installing the virtual media key" on page 100).
11. Reconnect to the system board the cables that you disconnected.
12. Install the cover (see "Removing and replacing the cover" on page 43).
13. Slide the server into the rack.
14. Reconnect the power cords and any cables that you removed.
15. Turn on the peripheral devices and the server.

Important: Perform the following updates:
- Either update the server with the latest RAID firmware or restore the pre-existing firmware from a diskette or CD image.
- Update the UUID.
- Update the DMI/SMBIOS.

Removing and installing a CD/DVD drive

To remove and install a CD/DVD drive, complete the steps in this section.

Removing a CD/DVD drive

To remove a CD/DVD drive, complete the following steps:
1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Press and hold the release tab **1** down as you push the drive **2** from the rear to slide it out of the bay.
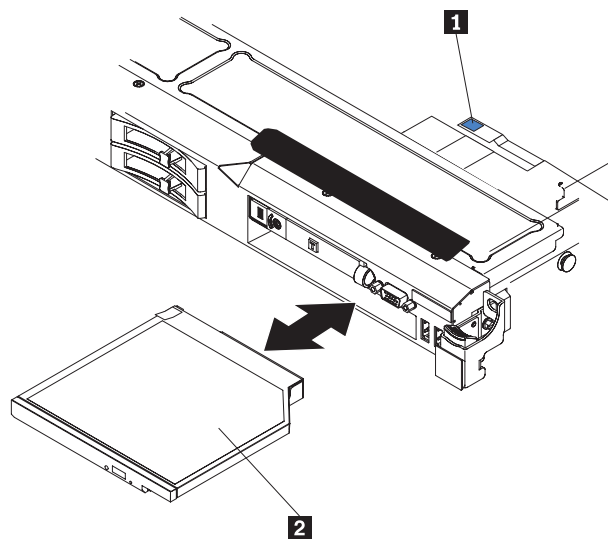
5. Slide the drive-retention clip **1** from the side of the drive **2** . Save the clip to use when you install the replacement drive.
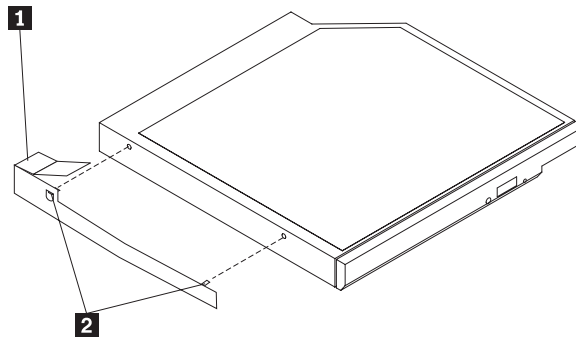
1	Drive-retention clip
2	Alignment pins

6. If you are instructed to return the CD/DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a CD/DVD drive

The following notes describe the type of drives that the server supports and other information that you must consider when you install a hard disk drive.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The server supports one ultra-slim SATA optical drive. The server comes standard with a CD/DVD-ROM installed.

If you need to replace a CD/DVD drive, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Disconnect the drive cable from the system board.
5. Locate the blue release tab **1** on the rear of the drive; then, while you press the tab, push the drive **2** toward the front of the server.
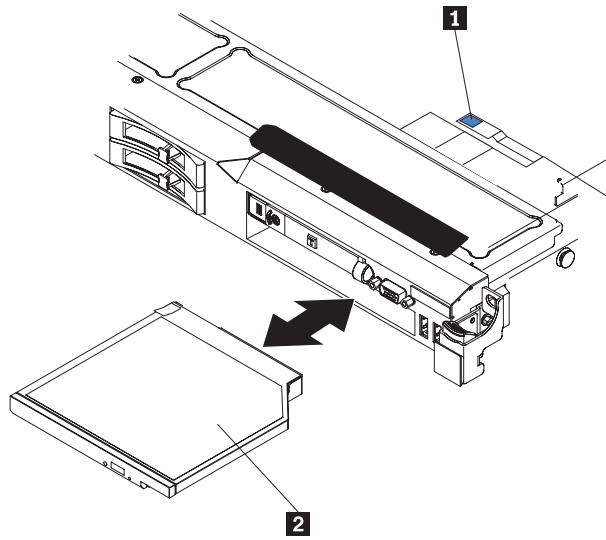
6. Install the retention clip to the side of the drive.
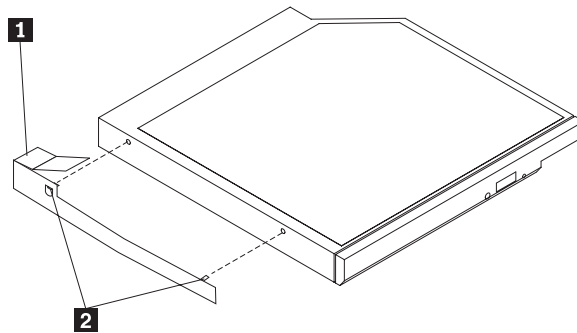
1 Drive-retention clip
2 Alignment pins

Note: If you are installing a drive that contains a laser, observe the following safety precaution.
Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

7. Slide the drive through the front of the server.
8. Touch the static-protective package that contains the new optical drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
9. Follow the instructions that come with the drive to set any jumpers or switches.
10. Attach the drive retention clip that you removed from the previous drive to the side of the new drive.
11. Align the drive in the drive bay and slide the drive into the CD/DVD drive bay until the drive clicks into place.
12. Connect the drive cable to the system board.

   The following illustration shows the cable routing for the CD/DVD drive:

   Note: The CD/DVD cable should go on the top of the operation information panel cable (in the middle) and the Video/USB cable (on the bottom) when all three cables are installed in the server.
13. Reconnect the power cord and any cables that you removed.
14. Turn on the peripheral devices and the server.

Removing a CD/DVD cable

To remove the CD/DVD cable, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Remove the fans in fan connectors 2, 3, and 4 (see "Removing a hot-swap fan assembly" on page 79).

5. Remove the CD/DVD drive.

6. From the front of the server, grasp the cable connector latch **1** and slide it up toward the fan bracket; then, press the spring latch **2** (right of the cable connector) and slide the cable connector to the right.

7. Remove the cable from the optical drive cage connector and set it aside.

8. If you are instructed to return the CD/DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the CD/DVD cable

To install the CD/DVD cable, complete the following cable:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords and external cables.

3. Align the cable connector with the connector on the rear of the optical drive cage and press the cable connector into the optical drive cage connector until it is firmly seated.

4. Pull the cable connector latch up and hold it there while you slide the cable connector to the left; then, slide the cable connector latch down to lock the cable in place.
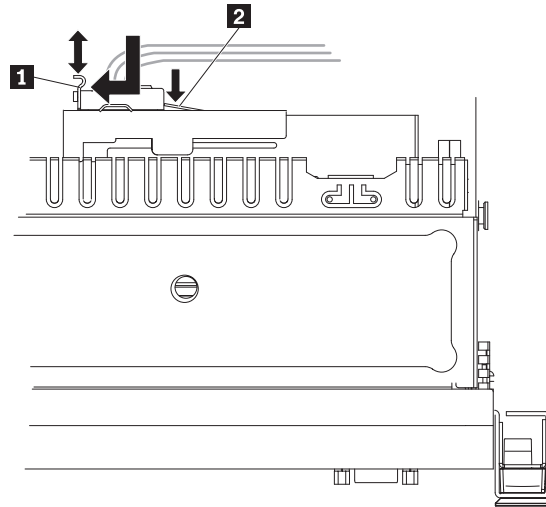
1 Cable connector latch
2 Spring latch on CD/DVD drive cage

The following shows cable routing for the CD/DVD cable:
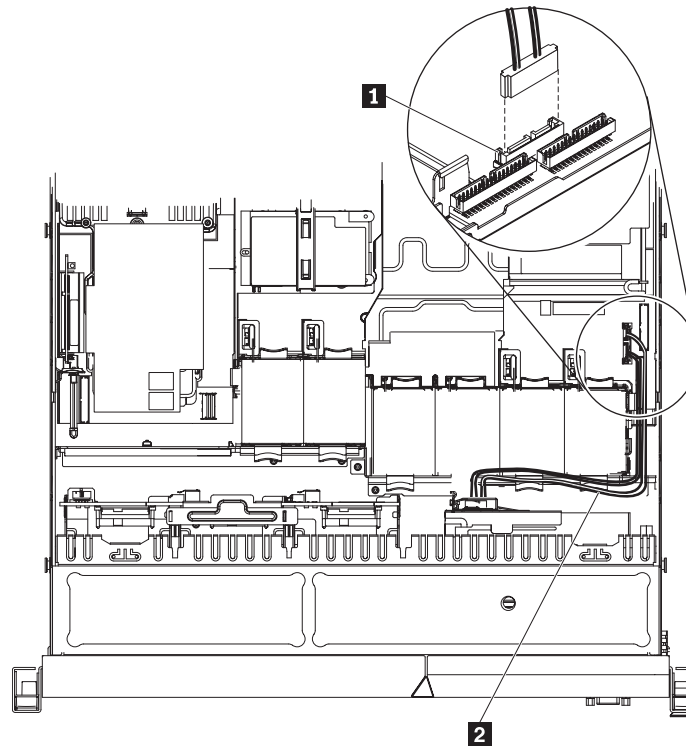
1 CD/DVD optical drive connector
2 CD/DVD drive cable

Note: The CD/DVD cable should be routed over the top of the operation information panel cable (in the middle) and the USB/Video cable (on the bottom) when all three cables are installed in the server.
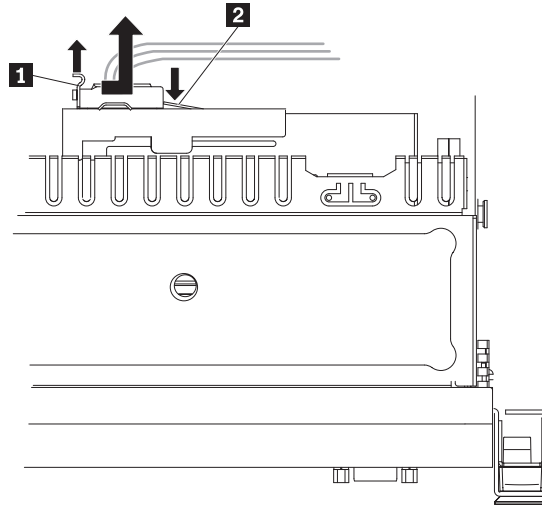
5. Reinstall the CD/DVD drive (see "Installing a CD/DVD drive" on page 95).
6. Reinstall the fans

7. Replace the cover
8. Slide the server into the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

Removing and installing the virtual media key

To remove and install the virtual media key, complete the steps in this section.

Removing the virtual media key

To remove the virtual media key, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Grasp the virtual media key and gently slide it up and off of the mounting tab.
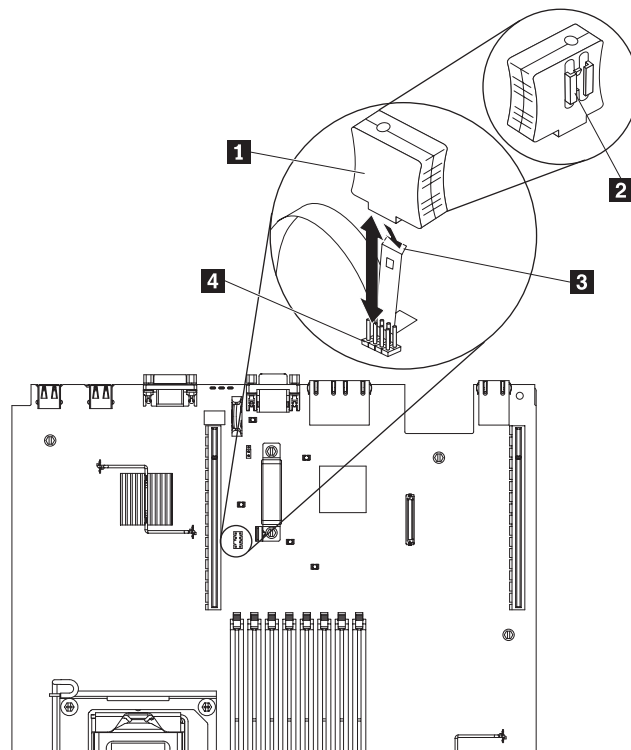
1	Virtual media key (front)
2	Mounting bracket (rear)
3	Mounting tab
4	Virtual media key connector

5. If you are instructed to return the virtual media key, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the virtual media key

To install the virtual media key, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Remove the cover (see "Removing and replacing the cover" on page 43).
3. Align the virtual media key with the mounting tab and slide it down the tab onto the connector on the system board. Press the virtual media key down into the connector until it is firmly seated on the system board.
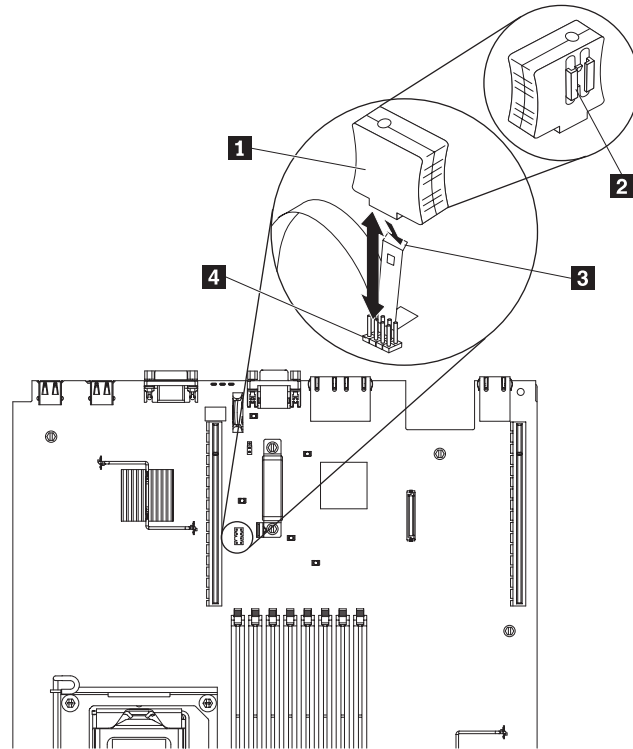
1	Virtual media key (front)
2	Mounting bracket (rear)
3	Mounting tab
4	Virtual media key connector

4. Replace the cover (see "Removing and replacing the cover" on page 43).
5. Slide the server into the rack.
6. Reconnect the power cord and any cables that you removed.
7. Turn on the peripheral devices and the server.

Removing and installing the optional two-port Ethernet adapter

To remove and install the optional two-port Ethernet adapter, complete the steps in this section.

Removing the optional two-port Ethernet adapter

To remove the optional two-port Ethernet adapter, complete the following steps:
1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Remove the PCI riser-card assembly from PCI riser connector 1 (see "Removing and installing a PCI riser-card assembly" on page 53).

5. Press the retention tabs away from the adapter.

6. Grasp the Ethernet adapter and disengage it from the connector on the system board; then, slide it out of the slot on the rear of the chassis and lift it out of the server.
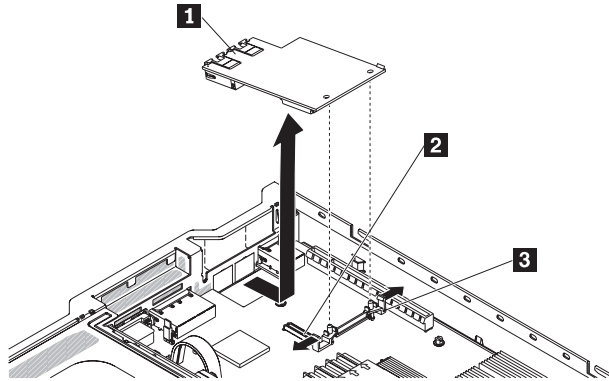
1 Ethernet adapter
2 Ethernet adapter connector
3 Adapter bracket

7. If you are instructed to return the Ethernet adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the optional two-port Ethernet adapter

To install the Ethernet adapter, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Remove the cover (see "Removing and replacing the cover" on page 43).

3. Touch the static-protective package that contains the Ethernet adapter to any unpainted metal surface on the server. Then, remove the Ethernet adapter from the package.

4. Remove the Ethernet adapter filler panel on the rear of the chassis (if it has not been removed already).

5. Attach the Ethernet adapter bracket to the Ethernet adapter (if the bracket is not already installed on the system board).

6. Align the adapter with the Ethernet adapter connector on the system board.
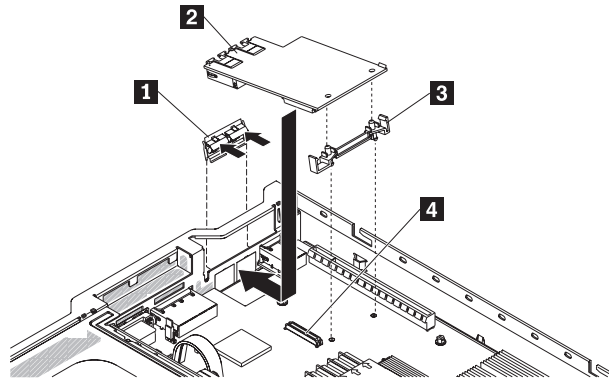
1	Ethernet adapter filler panel
2	Ethernet adapter
3	Adapter bracket
4	Ethernet adapter connector

7. Lower the adapter onto the connector and press it firmly into the connector on the system board until it is seated firmly.

8. Reinstall the PCI riser-card assembly in PCI riser connector 1 (see "Removing and installing a PCI riser-card assembly" on page 53).

9. Replace the cover (see "Removing and replacing the cover" on page 43).

10. Slide the server into the rack.

11. Reconnect the power cord and any cables that you removed.

12. Turn on the peripheral devices and the server.

Removing and installing the PCI riser-card bracket from the riser card

To remove and install the PCI riser-card bracket from the riser card, complete the steps in this section.

Removing the PCI riser-card bracket from the riser card

To remove the PCI riser-card bracket from the riser-card, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Remove the PCI riser-card assembly from PCI riser connector 1 (see "Removing and installing a PCI riser-card assembly" on page 53).

5. Press the retention tabs away from the adapter.

6. Remove the screw that attaches the PCI riser card to the PCI bracket.
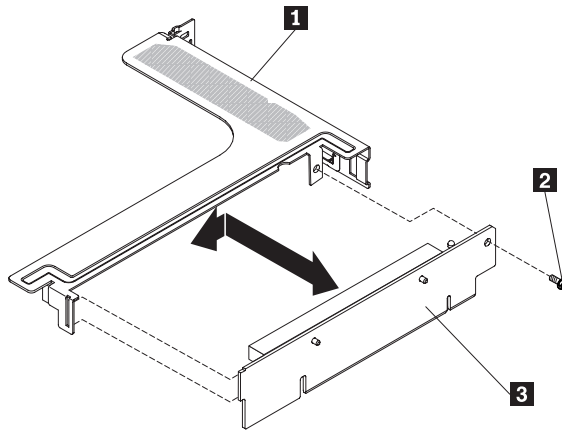
| 1 | PCI riser-card bracket |
| 2 | Screw |
| 3 | PCI riser-card |

7. If you are instructed to return the PCI bracket, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the PCI riser- card bracket from the riser card

To install the PCI riser-card bracket to the riser card, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Align the holes on the PCI riser card and the PCI bracket and install the screw that attaches the PCI riser-card to the PCI bracket.
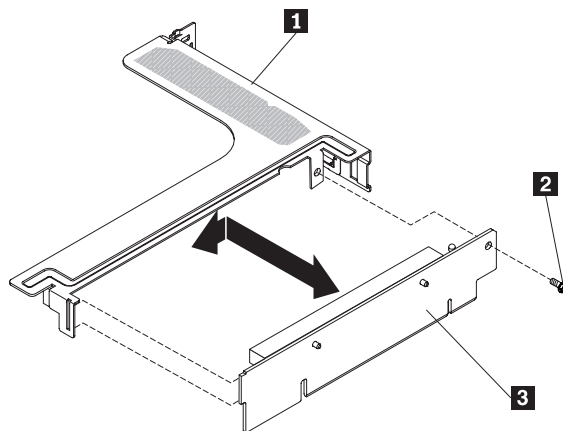
1	PCI riser-card bracket
2	Screw
3	PCI riser-card

5. If you need to install an adapter, see "Removing and installing an adapter" on page 55.
6. Install the PCI riser card assembly (see "Removing and installing a PCI riser-card assembly" on page 53).

7. Reconnect the cables for the adapter.

8. Install the cover (see "Removing and replacing the cover" on page 43).

9. Slide the server into the rack.

10. Reconnect the power cords and any cables that you removed.

11. Turn on the peripheral devices and the server.

Removing and installing a remotely installed RAID adapter battery

To remove and install a remotely installed RAID adapter battery, complete the steps in this section.

Removing a remotely installed RAID adapter battery

If a RAID adapter battery is installed remotely on the microprocessor 2 air baffle and you need to replace it, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. From the top of the microprocessor 2 air baffle, remove the battery retention clip that holds the battery in place. Press the release tab toward the front of the server and remove the battery retention clip.
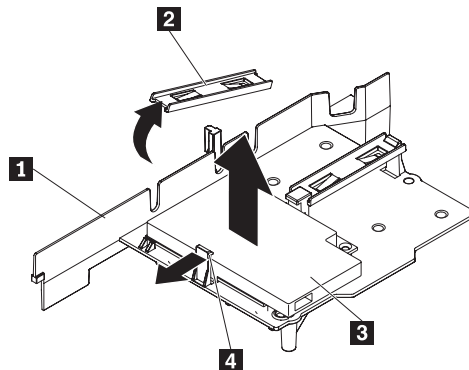
1	Microprocessor 2 air baffle
2	Battery retention clip
3	Battery
4	Release tab

5. Disconnect the remote battery cable from the remote battery cable connector on the battery carrier and lift the battery and battery carrier from the slot. See the following illustration for the location of the connectors on the battery carrier.
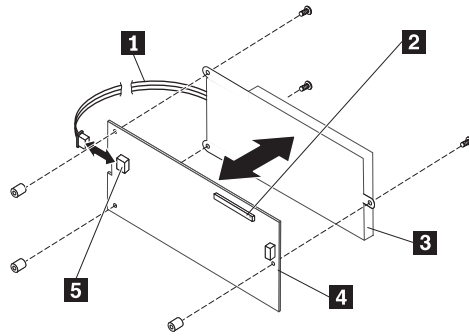
1	Battery cable
2	Remote battery cable connector
3	Battery
4	Battery carrier
5	Battery connector

6. Disconnect the battery cable from the battery cable connector on the battery carrier.

7. Remove the three screws that attaches the battery carrier to the battery and remove the battery from the battery carrier.

   Note: If your battery 1 and battery carrier 2 are attached with a clip, squeeze the clip on the side of the battery carrier to remove the battery from the battery carrier.
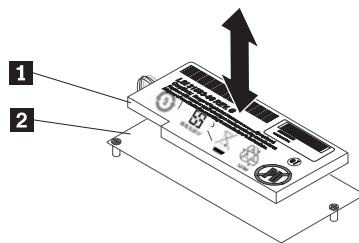
If you are instructed to return the RAID adapter battery, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a RAID adapter remotely in the server

When you install any RAID adapter that come with batteries in the PCI slot 1 and PCI slot 2, it is sometimes necessary to install the batteries in another location in the server to prevent the batteries from overheating. The batteries must be installed only on top of the microprocessor 2 air baffle. To install the RAID adapter battery in the server, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords.

3. Remove the cover (see "Removing and replacing the cover" on page 43).

4. Route the remote battery cable through the notches on the microprocessor 2 air baffle.

   Attention: Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

5. Install the battery on the microprocessor 2 air baffle:

- Connect the battery cable to the battery cable connector on the battery carrier.
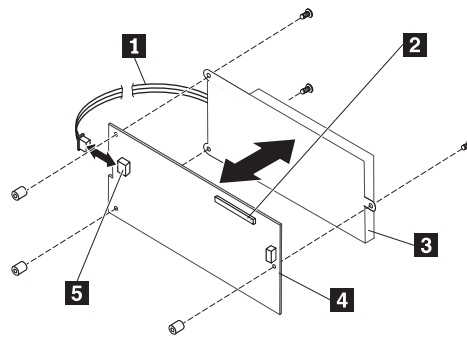
1	Battery cable
2	Remote battery cable connector
3	Battery
4	Battery carrier
5	Battery connector

- Place the battery carrier in the battery mounting slot on the microprocessor 2 air baffle and ensure that battery carrier posts align with the rings on the battery mounting slot so that the battery carrier is secure in the slot.

  Note: The positioning of the remote battery depends on the type of remote battery that you install.
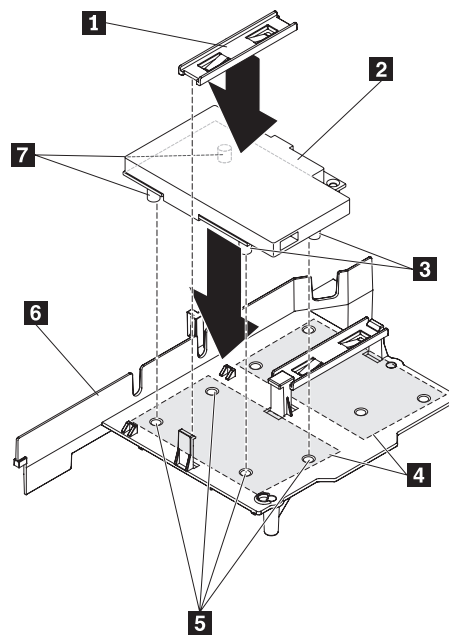
1	Battery retention clip
2	Battery
3	Posts
4	Battery mounting slots
5	Rings
6	Microprocessor 2 air baffle
7	Posts

- Take the battery retention clip and place it underneath the other tab while pressing release tab toward the front of the server; then, press it down until it snaps in place to hold the battery carrier firmly in place.

6. Install the cover (see "Removing and replacing the cover" on page 43).

7. Slide the server into the rack.

8. Reconnect the power cords and all external cables, and turn on the server and peripheral devices.

Removing and installing the bezel

To remove and install the bezel, complete the steps in this section.

Removing the bezel

To remove the bezel, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. Turn off the server and peripheral devices and disconnect all power cords.

3. Remove the hard disk drives and filler panels from the hard disk drive bays (see "Removing and installing a hot-swap hard disk drive" on page 50).

4. Remove the screws **1** from the bezel **2** .
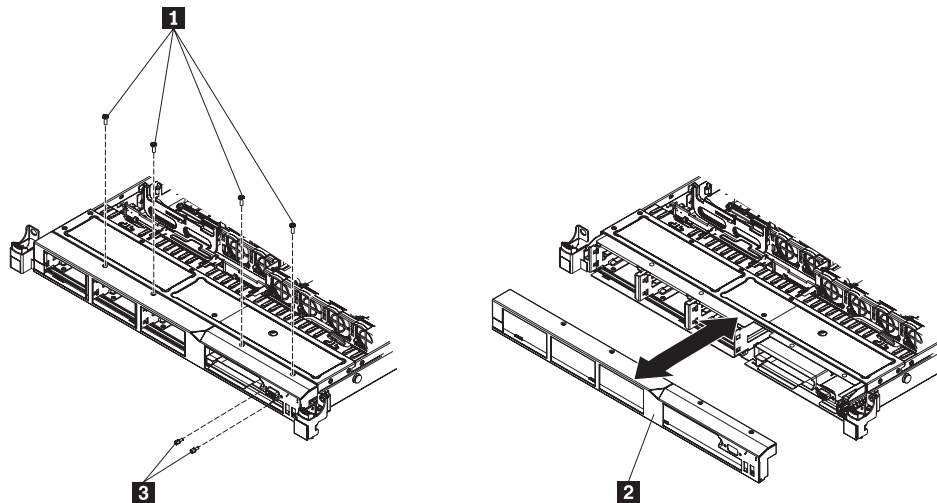
5. Remove the screws from the video connector **3** .

6. Pull the top of the bezel out slightly; then, rotate it downward until the tabs on the bottom of the bezel disengages from the chassis and set it aside.

Installing the bezel

To install the bezel, complete the following steps:

1. Insert the tabs on the bottom of the bezel into the holes on the chassis.

2. Rotate the bezel **2** upward to the server and reinstall the bezel screws **1** .
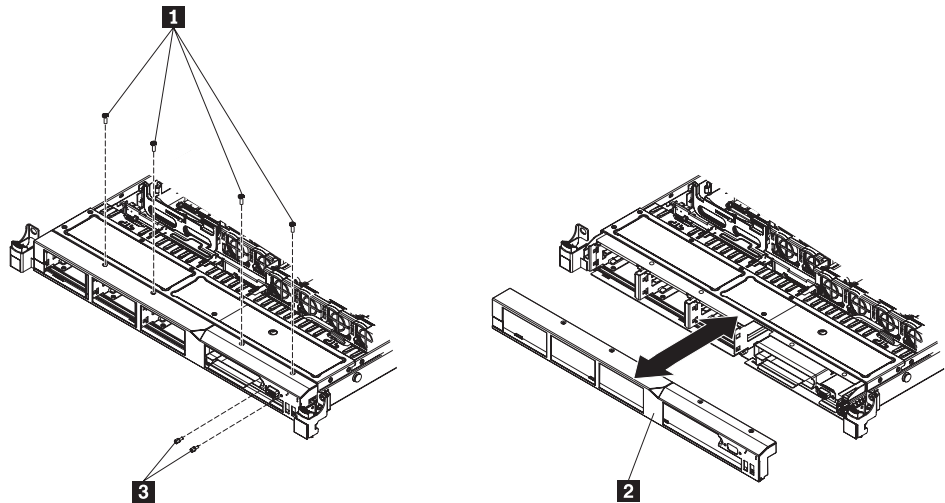
3. Reinstall the screws on the video connector **3** .
4. Reinstall the hard disk drives and drive bay filler panels into the drive bays.
5. Install the cover (see "Removing and replacing the cover" on page 43).
6. Reconnect the power cords and any cables that you removed.
7. Slide the server into the rack.
8. Turn on the peripheral devices and the server.

Removing and installing the operator information panel assembly

To remove and install the operator information panel, complete the steps in this section.

Removing the operator information panel assembly

To remove the operator information panel, complete the following steps.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing and replacing the cover" on page 43).
4. Disconnect the cable from the back of the operator information panel **1** assembly.
5. Use an object to push down on the release tab; hold down the release tab **2** and push the blue push point on the rear of the panel to the front of the server.
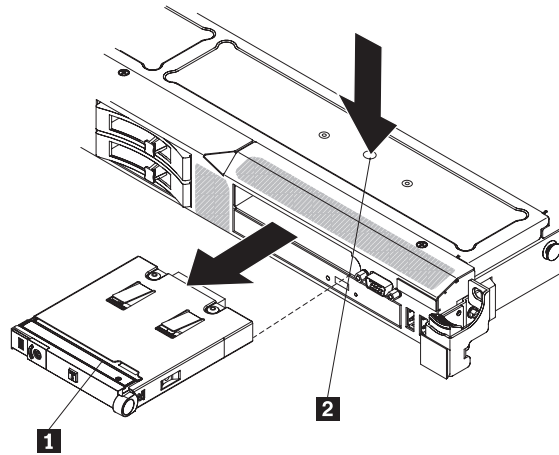
6. From the front of the server, carefully pull the assembly out of the server while you move it slightly from side to side.

7. If you are instructed to return the operator information panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the operator information panel assembly

To install the operator information panel, complete the following steps.

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

2. From the front of the server, slide the operator information panel into the server until it clicks into place.

3. Inside the server, connect the cable to the rear of the operator information panel **1** assembly.

The following illustration shows the cable routing for the operator information panel:

Note: The operation information panel cable should go in between the Video/USB cable (on the bottom) and the CD/DVD cable (on the top) when all three cables are installed in the server.
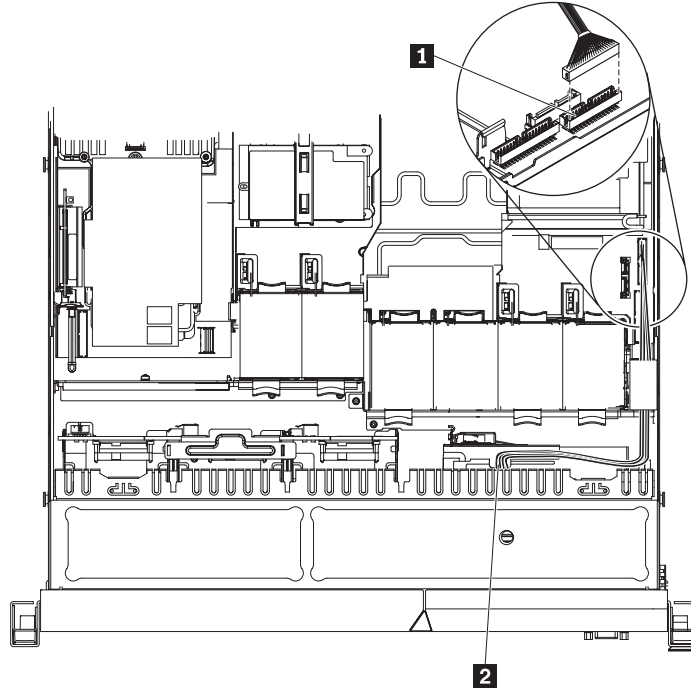
1	Operator information panel cable
2	Operator information panel connector

4. Install the cover (see "Removing and replacing the cover" on page 43).
5. Slide the server into the rack.
6. Reconnect the power cords and any cables that you removed.
7. Turn on the peripheral devices and the server.

Completing the installation

To complete the installation, complete the following steps:

1. If you removed any air baffles, reinstall them now (see "Removing and installing the DIMM air baffle" on page 48).
2. If you removed the cover, replace it (see "Removing and replacing the cover" on page 43).
3. Install the server in the rack cabinet (see the *Rack Installation Instructions* that come with the server for instructions).
4. Reconnect the cables and power cords.
5. Update the server configuration (see "Updating the server configuration" on page 113).
6. Slide the server back into the rack, if necessary.

Connecting the cables

The following illustration shows the locations of the input and output connectors on the front of the server.

1	Hard disk drive activity LED (green)	11	Rack release latch
2	Hard disk drive status LED (amber)	12	USB 2 connector
3	Drive bay 0	13	Optical drive eject button
4	Drive bay 2	14	Optical drive activity LED
5	Drive bay 4	15	Optical drive bay
6	Power-control button and LED	16	Drive bay 5
7	Operator information panel	17	Drive bay 3
8	Operator information panel release latch	18	Drive bay 1
9	Video connector	19	Rack release latch
10	USB 1 connector		

The following illustration shows the LEDs on the rear of the server.

1	Slot 1, PCI Express	11	USB 3 connector
2	Ethernet activity LED	12	Serial connector
3	Ethernet link LED	13	System-error LED (amber)
4	Video connector	14	System-locator LED (blue)
5	Slot 2, PCI Express	15	Power-control button LED (green)
6	USB 4 connector	16	Ethernet 2 connector
7	AC LED (green)	17	Ethernet 1 connector
8	DC LED (green)	18	Ethernet connectors 3 and 4 (with optional 2-port Ethernet card)
9	Power supply error LED (amber)	19	System management Ethernet connector
10	Power cord connectors		

You must turn off the server before you connect or disconnect cables.

See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.

Cable identifiers are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.
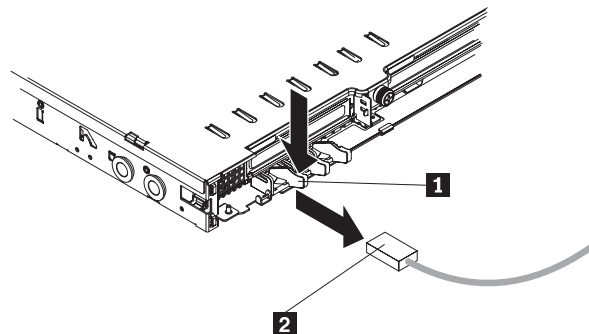
1	USB cable release lever		
2	USB cable		

There are release levers on the Ethernet and systems management connectors. To disconnect a cable from one of these connectors, pull up on the lever to release the cable.
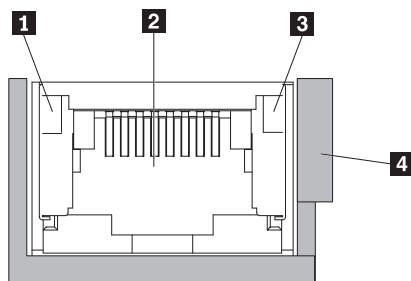
1	Ethernet activity LED	**3**	Ethernet speed LED
2	Ethernet port	**4**	Ethernet cable release lever

Updating the server configuration

When you start the server for the first time after you add or remove an internal option or external device, you might receive a message that the configuration has changed. The UEFI Setup Utility program starts automatically so that you can save the new configuration settings.

Some options have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each option.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

For information about configuring the integrated Gigabit Ethernet controller, see "Configuring the Gigabit Ethernet controllers" on page 138.

Chapter 6. Configuring the server

The following configuration programs come with the server:

- **Configuration/Setup Utility program**

  The Configuration/Setup Utility program is part of the UEFI. Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords.

- **Boot Manager program**

  The Boot Manager program is part of the server firmware. Use it to override the startup sequence that is set in the Setup utility and temporarily assign a device to be first in the startup sequence.

- **LSI Configuration Utility program**

  Use the LSI Configuration Utility program to configure the integrated SAS/SATA controller with RAID capabilities and the devices that are attached to it. For information about using this program, see "Using the LSI Configuration Utility program" on page 123

- **ThinkServer EasyStartup program**

  This program simplifies the process of configuring your RDID controller and device drivers. It is on the *ThinkServer EasyStartup* DVD provided with your server. For details, see "Using the *EasyStartup* DVD" on page 127.

- **Broadcom Gigabit Ethernet Utility program**

  Use this program to specify where the network startup option is displayed in the startup sequence.

- **ThinkServer EasyManage products**

  ThinkServer EasyManage Core Server and ThinkServer EasyManage Agent work together to provide centralized hardware and software inventory management and secure automated system management through a single console. See "Installing ThinkServer EasyManage software" on page 134.

- **Integrated Management Module**

  Use the integrated management module (IMM) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network.

- **Remote presence capability and blue-screen capture**

  The remote presence and blue-screen capture feature are integrated into the integrated management module (IMM). IMM Premium is required to enable the remote presence functions. When IMM Premium is installed in the server, it activates the remote presence functions. Without IMM Premium, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you will still be able to access the Web interface without IMM Premium. You can order IMM Premium, if one did not come with your server.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see "Configuring the Gigabit Ethernet controllers" on page 138.

Using the Setup Utility

The Setup Utility program is part of the UEFI. You can use it to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- View and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- View and change settings for advanced hardware features
- View and clear the event and error logs
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

Starting the Setup utility

To start the Setup utility, complete the following steps:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.

3. Select settings to view or change.

UEFI Setup Utility menu choices

The following choices are on the Setup utility main menu for the UEFI. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information. This choice is on the full Setup utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other options in the Setup utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  – **Product Data**

    Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

  This choice is on the full Setup utility menu only.

- **System Settings**

  Select this choice to view or change the server component settings.

– **Processors**

Select this choice to view or change the processor settings.

– **Memory**

Select this choice to view or change the memory settings.

– **Devices and I/O Ports**

Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports; configure remote console redirection; enable or disable integrated Ethernet controllers, the SAS/SATA adapter, SATA optical drive channels, and PCI slots; and view the system Ethernet MAC addresses. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

– **Power**

Select this choice to view or change power capping to control consumption, processors, and performance states.

– **Legacy Support**

Select this choice to view or set legacy support.

- **Force Legacy Video on Boot**

Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

- **Rehook INT**

Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

- **Legacy Thunk Support**

Select this choice to enable or disable UEFI to interact with PCI mass storage devices that are non-UEFI compliant.

– **Integrated Management Module**

Select this choice to view or change the settings for the integrated management module.

- **POST Watchdog Timer**

Select this choice to view or enable the POST watchdog timer.

- **POST Watchdog Timer Value**

Select this choice to view or set the POST loader watchdog timer value.

- **Reboot System on NMI**

Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Disabled** is the default.

- **Disallow commands on USB Interface**

Select this choice to enable or disable the Ethernet over USB interface on IMM.

- **Network Configuration**

Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and the host name; define the static IMM IP address, subnet mask, and gateway address; specify whether to use the static IP address or have DHCP assign the IMM IP address; save the network changes; and reset the IMM.

- **Reset IMM to Defaults**

Select this choice to view or reset IMM to the default settings.

- **Reset IMM**

Select this choice to reset IMM.

– **System Security**

Select this choice to view or configure Trusted Platform Module (TPM) support.

– **Adapters and UEFI Drivers**

Select this choice to view information about the UEFI 1.10 and UEFI 2.0 compliant adapters and drivers installed in the server.

– **Network**

Select this choice to view or configure the network device options, such as iSCSI, PXE, and network devices.

Note: The configuration forms for UEFI 2.1 and greater compliant add-on network devices might be located here.

– **Storage**

Select this choice to view or configure the storage device options.

Note: The configuration forms for UEFI 2.1 and greater compliant add-on storage devices might be located here.

– **Video**

Select this choice to view or configure the video device options.

Note: The configuration forms for UEFI 2.1 and greater compliant add-on video devices might be located here.

- **Date and Time**

Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

This choice is on the full Setup utility menu only.

- **Start Options**

Select this choice to view or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

This choice is on the full Setup utility menu only.

- **Boot Manager**

Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

- **System Event Logs**

Select this choice to enter the System Event Manager, where you can view the error messages in the system event logs. You can use the arrow keys to move between pages in the error log.

The system event logs contain all event and error messages that have been generated during POST, by the systems-management interface handler, and by the system service processor. Run the diagnostic programs to get more information about error codes that occur.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the IMM system-event log. Also, after you

complete a repair or correct an error, clear the IMM system-event log to turn off the system-error LED on the front of the server.

– **POST Event Viewer**

Select this choice to enter the POST event viewer to view the POST error messages.

– **System Event Log**

Select this choice to view the IMM system event log.

– **Clear System Event Log**

Select this choice to clear the IMM system event log.

- **User Security**

Select this choice to set, change, or clear passwords. See"Passwords" for more information.

This choice is on the full and limited Setup utility menu.

– **Power-on Password**

Select this choice to set or change a power-on password. See "Power-on password" on page 120 for more information.

– **Administrator Password**

Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If an administrator password is set, the full Setup utility menu is available only if you type the administrator password at the password prompt. For more information, see "Administrator password" on page 121.

- **Save Settings**

Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

Select this choice to exit from the Setup utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **System Security** choice, you can set, change, and delete a power-on password and an administrator password. The **System Security** choice is on the full Configuration/Setup Utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup; you have access to the full Configuration/Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Configuration/Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Configuration/Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Configuration/Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

If a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt (see "Administrator password" on page 121). Start the Configuration/Setup Utility program and reset the power-on password.

- Remove the battery from the server and then reinstall it. For instructions for removing the battery, see the *Hardware Maintenance Manual* on the Lenovo Support Web site.

- Change the position of the clear CMOS jumper on the system board to bypass the power-on password check. See "Power-on password" for additional information.
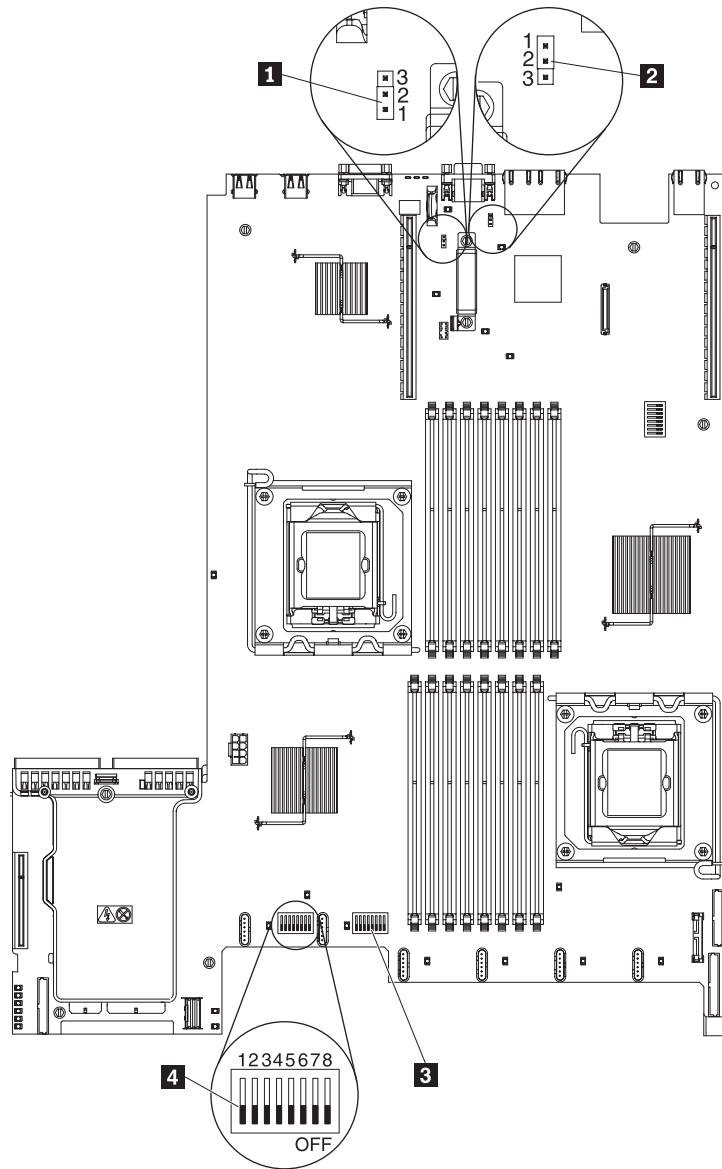
1	UEFI boot recovery jumper (J29)
2	IMM recovery jumper (J147)
3	SW4 switch block (reserved)
4	SW3 switch block

Attention: Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information in "Safety" on page vii and "Installation guidelines" on page 39. Do not change settings or move jumpers on any system-board switch or jumper block that is not shown in this document.

Administrator password

If an administrator password is set, you must type the administrator password for access to the full Setup utility menu. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Using the Boot Manager program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup utility.

To use the Boot Manager program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. When the prompt `<F12> Select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up arrow and Down arrow keys to select an item from the **Boot Selection Menu** and press **Enter**.

The next time the server starts, it returns to the startup sequence that is set in the Setup utility.

Configuring RAID controllers

The following table lists the various utilities available to configure RAID controllers before an operating system is installed.

Table 10. RAID utilities

RAID configuration utility	Description	Location	Where to find more information
EasyStartup RAID configuration utility	• For use with all factory-supported RAID controllers • Automatically detects hardware and lists all supported RAID configurations • Configures one disk array per controller using all drives currently attached to the controller • Created a RAID response file that can be used to configure RAID controllers on similarly configured Lenovo servers.	EasyStartup DVD	"Using the *EasyStartup* DVD" on page 127

RAID configuration utility	Description	Location	Where to find more information
MegaRAID BIOS Configuration Utility (WebBIOS)	For: • ServeRAID-MR10i controller • ServeRAID-MR10is controller • ServeRAID-MR10m controller	In system firmware. To access: • Use UEFI Setup Utility. • Press Ctrl + H at the WebBIOS prompt during startup.	"Using the WebBIOS utility" on page 125
LSI Logic MPT Setup Utility	For: • ServeRAID-BR10i controller • ServeRAID-BR10ie controller	In system firmware. To access: • Use UEFI Setup Utility. • Press Ctrl + C at the LSI prompt during startup.	"Using the LSI Configuration Utility program"

Using the LSI Configuration Utility program

Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use this program as described in this document.

• Use the LSI Configuration Utility program to:
  – Perform™ a low-level format on a hard disk drive
  – Create an array of hard disk drives with or without a hot-spare drive
  – Set protocol parameters on hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 1 (IM), RAID 1E (IME), and RAID 0 (IS) for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change settings for attached devices.

When you are using the LSI Configuration Utility program to configure and manage arrays, consider the following information:

• The integrated SAS/SATA controller with RAID capabilities supports the following features:
  – Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

    Use this option to create an integrated array of two disks plus up to two optional hot spares. All data on the primary disk can be migrated.

  – Integrated Mirroring Enhanced (IME) with hot-spare support (also known as RAID 1E)

    Use this option to create an integrated mirror enhanced array of three to eight disks, including up to two optional hot spares. All data on the array disks will be deleted.

  – Integrated Striping (IS) (also known as RAID 0)

    Use this option to create an integrated striping array of two to eight disks. All data on the array disks will be deleted.

- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- If you use an integrated SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing settings for attached devices.

Starting the LSI Configuration Utility program

To start the LSI Configuration Utility program, complete the following steps:

1. Turn on the server.

   Note: Approximately 3 minutes after the server is connected to ac power, the power-control button becomes active.

2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.

3. Select **System Settings → Adapters and UEFI drivers**.

4. Select **Please refresh this page first** and press Enter.

5. Select the device driver that is applicable for the SAS controller in the server. For example, **LSI Logic Fusion MPT SAS Driver**.

6. To perform storage-management tasks, see the SAS controller documentation.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Formatting a hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

Note: Before you format a hard disk, make sure that the disk is not part of a mirrored pair.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format and press Enter.

2. Select **SAS Topology** and press Enter.

3. Select **Direct Attach Devices** and press Enter.

4. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key. Press Alt+D.

5. To start the low-level formatting operation, select **Format** and press Enter.

Creating a RAID array of hard disk drives

To create a RAID array of hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for which you want to create an array.

2. Select **RAID Properties**.

3. Select the type of array that you want to create.

4. In the RAID Disk column, use the Spacebar or Minus (-) key to select **[Yes]** (select) or **[No]** (deselect) to select or deselect a drive from a RAID disk.

5. Continue to select drives, using the Spacebar or Minus (-) key, until you have selected all the drives for your array.

6. Press C to create the disk array.

7. Select **Save changes then exit this menu** to create the array.

8. Exit the Setup utility.

Using the WebBIOS utility

The WebBIOS configuration utility enables you to create and manage RAID configurations on LSI SAS controllers. The WebBIOS utility resides in the SAS controller BIOS and operates independently of the operating system. The WebBIOS utility provides a configuration wizard to guide you through the configuration of virtual disks and physical arrays.

Starting the WebBIOS utility

Perform the following steps to start the WebBIOS utility and access the main menu:

1. After you turn on the power and when the computer is starting, you are prompted to press Ctrl + H when the following message is displayed:

```
Copyright© LSI Logic Corporation
Press <Ctrl><H> for WebBIOS
```

2. Select an adapter from the list.

3. Click **Start**. The main WebBIOS utility interface is displayed. You can toggle between the physical view and logical view of the storage devices that are connected to the controller. Click **Physical View** or **Logical View** on the menu in the left pane to change the view.

Main menu of the WebBIOS utility

The main menu includes the following options:

Adapter Properties
> From this view, you can display and modify the properties of the SAS adapter that is currently selected.

Scan Devices
> From this view, you can re-scan the physical and virtual disks for any changes in the drive status or physical configuration.

Virtual Disks
> From this view, you can display and modify the virtual disk properties, delete virtual disks, initialize disks, and perform other tasks.

Physical Drives
> From this view, you can view the physical drive properties, create hot spare disks, and perform other tasks.

Configuration Wizard
> Select this to start the Configuration Wizard and create a new storage configuration, clear a configuration, or add a new configuration.

Adapter Selection
> From this view, you can select a different SAS adapter. Then, you can view information about the adapter and the drives connected to it, or create a new configuration for the adapter.

Physical View or Logical View

Select this to toggle between the Physical View and Logical View.

Events

From this view, you can display the system events in the Event Information page.

Exit Select this to exit the WebBIOS utility and continue with the system boot.

Creating a storage configuration using the Configuration Wizard

Follow these steps to start create a storage configuration:

1. Click **Configuration Wizard** to start the wizard.
2. Select a configuration option:

   Attention: If you select **Clear Configuration** or **New Configuration**, all existing data in the configuration is deleted. Make a backup copy of any data that you want to keep before selecting these options.

   Clear Configuration

   Clears the existing configuration.

   New Configuration

   Clears the existing configuration and lets you create a new configuration.

   Add Configuration

   Retains the existing storage configuration and adds new drives to it (this does not cause any data loss).

3. Click **Next**.
4. Select a configuration mode from the following options:

   Custom Configuration

   In this mode, you can control all attributes of the new storage configuration.

   Auto Configuration and Redundancy

   This mode automatically creates an optimal RAID 1 or RAID 5 configuration, providing data redundancy.

   Auto Configuration without Redundancy

   This mode automatically created a non-redundant RAID 0 configuration.

5. Click **Next** to continue.

Viewing and changing adapter properties

You can view information for one LSI SAS adapter at a time. If your system has multiple LSI SAS adapters, you can view information for a different adapter, click **Adapter Selection** on the main view. To view the properties for the currently selected adapter, click **Adapter Properties** on the main WebBIOS screen.

Viewing and changing virtual disk properties

On the WebBIOS main screen, select a virtual disk from the list and click **Virtual Disk**.

The Properties panel displays the RAID level, state, size, and stripe size.

The Policies panel lists the virtual disk policies that were defined when the storage configuration was created. To change any of these policies, select a policy from the

menu and click **Change**. The Operations panel lists operations that can be performed on the virtual disk. Select the operation and click **Go**. Then choose from the following operations:

- Select **Del** to delete this virtual disk.
- Select **Locate** and the LEDs flash on the physical drives used by this virtual disk.
- Select **Fast** or **Slow** to initialize this virtual disk.

  Attention: Before you run an initialization, back up any data on the virtual disk that you want to save. All data on the virtual disk is lost when you initialize it.

Using the *EasyStartup* DVD

The *EasyStartup* DVD simplifies the process of configuring your RAID controller and installing an operating system. The program works in conjunction with your Windows or Linux operating-system installation disc to automate the process of installing the operating system and associated device drivers.

If you did not receive an *EasyStartup* DVD with your server, you can download an image from the Lenovo Support Web site at http://www.lenovo.com/support.

The EasyStartup program has the following features:
- Self-booting DVD
- Easy-to-use, language-selectable interface
- Integrated help system
- Automatic hardware detection
- RAID configuration utility
- Device drivers (based on the server model and detected devices)
- Selectable partition size and file system type
- Support for Windows, Red Hate, and SUSE Server operating systems
- Installs the operating system and device drivers in an unattended mode to save time
- Creates a reusable response file that can be used with similarly configured Lenovo servers to make future installations even faster.

Before you use the *EasyStartup* DVD

Functionality and supported operating systems can vary with different versions of the EasyStartup program. To learn more about the version you have, do the following:

1. Insert the *EasyStartup* DVD and restart the server.
2. Advance to the Home screen.
3. Click **Compatibility notes**. The compatibility notes feature provides detailed information about the operating systems and server configurations supported by that version of the EasyStartup program.
4. Click **User Guide**. The User Guide provides an overview of the various functions provided by that version of the EasyStartup program.

Before using the EasyStartup program to install an operating system, make sure any external storage devices and fiber channels are configured correctly.

Configuring RAID

The RAID configuration feature that is part of the EasyStartup program enables you to view and change RAID settings for supported RAID controllers. Through this feature, you have the ability to select one RAID level for each installed controller, and the program automatically will use the discs currently attached to the controller to support that RAID level. This method satisfies most users' needs.

If you have a need to assign a primary and secondary RAID on the same controller and assign some of your discs to the primary RAID and some to the secondary RAID, you can use either of the following methods:

- **Manually remove the drives that you do not want included in your primary array before you configure your RAID controller through the EasyStartup program.**

  This method enables you to use the EasyStartup program to configure your RAID controller and install the operating system. After the operating system is installed, reinstall the drives and use the RAID configuration utility provided in the firmware to configure the secondary RAID.

- **Configure the controller using the RAID configuration utility provided in the firmware before you use the EasyStartup program.**

  For details, see "Using the LSI Configuration Utility program" on page 123. After your RAID controller is configured, start the EasyStartup program and install your operating system.

EasyStartup overview

The EasyStartup program requires a supported Lenovo server with an enabled, startable (bootable) DVD drive. In addition to the *EasyStartup* DVD, you also must have the operating-system installation CD or DVD and the product key or installation number for the operating system (if provided).

The EasyStartup program performs the following tasks:

- Detects installed hardware devices
- Guides you through the process of configuring one or more RAID controllers
- Guides you through the process of creating a response file for the unattended installation of the operating system
- Enables you to create scripts or commands that run at the end of the operating system installation process
- Facilitates the installation of the ThinkServer EasyManage products and DVD-burning software (Windows installation only)
- Prepares the hard disk for installation
- Prompts you to insert the operating-system installation disc
- Initiates an unattended installation of the operating system and device drivers

Setup and configuration

When you start the *EasyStartup* DVD, you will be prompted for the following:

- Select the language in which you want to view the program.
- Select the language of the keyboard you will be using with the program.

Note: The following language keyboards are supported: English, French, German, Spanish, Japanese, Korean, Turkish, Italian, and Dutch.

You will then see one or more reminders about configuring storage devices, and then you will be presented with the Lenovo License Agreement. Read the license agreement carefully. You must agree with terms in order to continue.

After agreeing to the license agreement, you will be given the following choices:
- Continue to the main program interface
- Use a shortcut to install an operating system based a response file that you previously created using the EasyStartup program
- Use a short cut to configure RAID controllers based on a RAID response file that you previously created using the EasyStartup program

If you continue to the main program interface, you will have the following selectable options:
- **Compatibility notes:** This selection provides information about the operating systems and server configurations supported by that version of the EasyStartup program.
- **User Guide:** This selection provides information about the features provided by that version of the EasyStartup program.
- **Hardware list:** This selection displays a list of hardware devices detected by the EasyStartup program.
- **Configure RAID:** This selection enables you to view the current RAID configuration for each installed RAID controller and make changes if needed.
- **Install operating system:** This selection displays a series of choices and prompts to collect information required for installation, prepares the hard disk for installation, and then initiates the installation process using the user-provided operating-system installation CD or DVD.
- **About:** This selection displays version information and legal notices.

Typical operating system installation

When you select **Install operating system**, you will be prompted for information required for the installation. The prompts vary depending on the operating system selected. This section describes the tasks associated with a typical Windows operating system installation. Each task must be completed in order before moving to the next task.

Note: Ensure that your RAID controller is correctly configured before you select an operating system to install.
- **Select operating system:** This task enables you to select the operating system that you will be installing.
- **Select disk:** This task enables you to select the disk where you want to install the operating system.

   Note: The disk that you select must be set as the boot disk in UEFI.
- **Partitions options:** This task enables you to choose whether you want to repartition the selected drive or use an existing partition.
- **Partition settings:** This task enables you to choose the file system type and define the partition size.
- **Installation settings:** This task prompts you for user and system settings, the operating system product key, and the administrator password.
- **Network settings:** This task prompts you for domain and workgroup settings, Ethernet controller type, IP address settings, DNS settings, and WINS address settings.

- **Install applications:** This task enables you to run custom commands or scripts at the end of the installation process. It also facilitates the installation of DVD-burning software and ThinkServer EasyManage software products.
- **Install Windows components:** This task enables you to install optional Windows components such as IIS, ASP.NET, and SNMP.
- **Confirm settings:** This task enables you to review all of the information you provided.
- **Save response file:** This task gives you the option of saving the information on a diskette or USB device as a response file for future installations on similarly configured Lenovo servers.
- **Start installation:** This task starts the actual installation process. First, the disk is prepared using the disk and partition information you specified. Then you are prompted to insert the operating system disk, and the operating system is installed using the information that you specified.

Installing your operating system without using EasyStartup

If you have already configured the server hardware and you are not using the EasyStartup program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the Lenovo® Support Web site:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer RD210**, and click **Continue**.
4. Select the operating system that you want from the **Operating system** list, and click **Continue**.
5. Click **Operating system installation** to download instructions to install the operating system.

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility program is part of the server firmware. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence. Enable and disable the Broadcom Gigabit Ethernet Utility program from the Setup utility.

Updating the firmware

The firmware in the server is periodically updated and is available for download on the Lenovo Support Web site. Go to http://www.lenovo.com/support to check for the latest level of firmware, such as unified extensible firmware interface (UEFI) code, vital product data (VPD) code, device drivers, and service processor firmware.

When you replace a device in the server, you might have to either update the server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

- UEFI code is stored in ROM on the system board.
- IMM firmware is stored in ROM on the baseboard management controller on the system board.

- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the SAS controller.
- SAS firmware is stored in ROM on the integrated RAID controller on the system board.
- Major components contain vital product data (VPD) code. You can select to update the VPD code during theUEFI code update procedure.

The following items are downloadable at http://www.lenovo.com/support:
- Diagnostics programs
- IMM firmware
- Ethernet firmware

Using the EasyUpdate Firmware Updater tool

ThinkServer EasyUpdate Firmware Updater is a software application that enables you to maintain your system firmware up to date and helps you avoid unnecessary outages. Firmware Updater updates the server firmware in two steps, by updating system and adapter firmware and updating hard disk drive (HDD) firmware.

To update your system, first go the Lenovo Support Web site and obtain the ISO file.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer RD210**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.
5. Download the ThinkServer fimrware update media ISO file.
6. Burn the ISO image to CD or DVD.
7. Insert the media in the server CD/DVD drive, and boot the server to that drive.
8. After DOS starts, the master application starts automatically. Hardware detection runs, and a list of applicable firmware updates is displayed.
9. Select the firmware updates that you want to install.

Before distributing the firmware update to other servers, ensure that your server can restart successfully without encountering hardware problems.

Starting the backup server firmware

The system board contains a backup copy area for the server firmware. This is a secondary copy of the server firmware that you update only during the process of updating the server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the J29 jumper in the backup position (pins 2 and 3).

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the J29 jumper back to the primary position (pins 1 and 2).

Recovering the UEFI firmware

If the UEFI firmware has become damaged, such as from a power failure during an update, you can recover the UEFI firmware using the boot block jumper and a UEFI recovery diskette.

The system board contains a backup copy area for the server firmware. This is a secondary copy of the server firmware that you update only during the process of updating the server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the J29 jumper in the backup position (pins 2 and 3).

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the J29 jumper back to the primary position (pins 1 and 2).
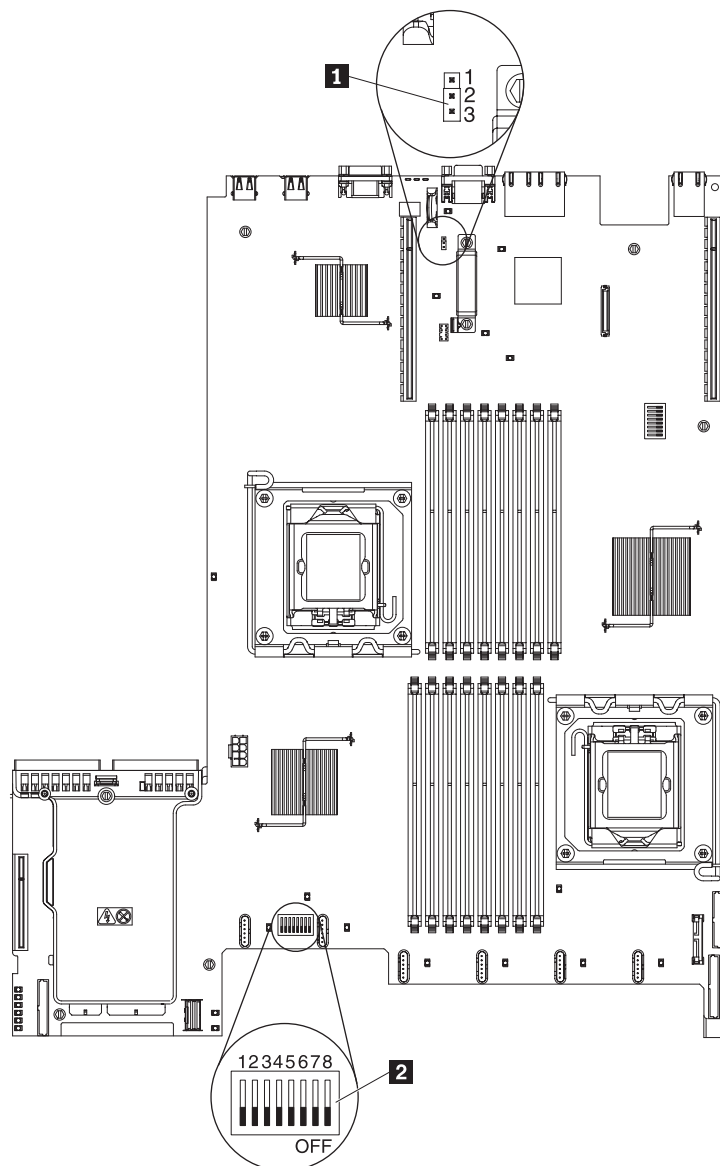
Using the integrated management module

The integrated management module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and (when IMM Premium is installed) remote presence function in a single chip.

The IMM supports the following basic systems-management features:
- Environmental monitor with fan speed control for temperature, voltages, fan failure, and power supply failure.
- EasyLED diagnostics LEDs indicators to report errors that occur with fans, power supplies, microprocessor, hard disk drives, and system errors.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM lights the associated system error LED and the failing DIMM error LED.
- System event log (SEL).
- ROM-based IMM firmware flash updates.
- Auto Boot Failure Recovery (ABR).
- IMM Premium, which enables remote presence support (remote video, remote keyboard/mouse, and remote storage).
- Automatic microprocessor disable on failure and restart in a two-microprocessor configuration when one microprocessor signals an internal error. When one of the microprocessors fail, the server will disable the failing microprocessor and restart with the other microprocessor.
- Nonmaskable interrupt (NMI) detection and reporting.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating system watchdog timer times-out. The IMM might be configured to watch for the operating system watchdog timer and reboot the system after a timeout, if the ASR feature is enabled. Otherwise, the IMM allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the system board for an operating-system memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CNFG) LED support.
- Serial port redirection over telnet or ssh.
- Serial over LAN (SOL).
- Active Energy Manager.
- Query power-supply input power.
- PECI 2 support.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Operating-system failure blue screen capture.
- Command-line interface.
- Configuration save and restore.
- PCI configuration data.
- Boot sequence manipulation.

The IMM also provides the following remote server management capabilities:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

IBM Advanced Settings Utility program

The IBM Advanced Settings Utility (ASU) program is an alternative to the UEFI Setup Utility program for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the system to access the UEFI Setup Utility program.

You also can use the ASU program to configure the optional remote presence features or other IMM settings. The remote presence features provide enhanced systems-management capabilities.

In addition, the ASU program provides limited settings for configuring the IPMI function in the IMM through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The ASU program supports scripting environments through a batch-processing mode.

Installing ThinkServer EasyManage software

You can install the ThinkServer® EasyManage Core Server program from the ThinkServer EasyManage CD or you can download and install the program from http://www.lenovo.com/support. After one instance of the ThinkServer EasyManage Core Server has been installed, you can use the ThinkServer EasyManage Agent installer to install the agent on other servers and clients on the network.

Also, the ThinkServer EasyStartup™ program provides an option to either install the ThinkServer EasyManage Agent as part of the operating system installation process or install a desktop icon to assist with the installation of the ThinkServer EasyManage Core Server after the operating system has been installed.

Installation requirements

Before installing ThinkServer EasyManage software on your server, your environment must meet the following requirements:

- Microsoft® Windows Server 2003 or Windows Server 2008 is installed on the server where you intend to install the Core Server.
- The original Windows Server operating system installation CDs are available in case files are needed while installing the prerequisites.
- The server has Internet access to obtain prerequisites and to activate the software after the installation is complete.
- The server has a static IP address.

- The server is not a domain controller. However, it is recommended to have the server join a domain.
- The account that you use to log in and to install the Core Server has Administrator privileges on the server with full read/write access. Ideally, this account is also a Domain Administrator account. This account will be used to create the initial administrator-level account used to log in to the ThinkServer EasyManage console.
- Any previous agent from EasyManage or LANDesk must be removed prior to installing the Core Server and Management Console.

Installation order

The order in which you install the operating system and Windows Components is critical to install ThinkServer EasyManage software successfully. To ensure a clean, working installation of ThinkServer EasyManage software, use the following installation order:

1. Install Microsoft Windows Server 2003 or Microsoft Windows Server 2008 32-bit with the latest Service Pack.
2. Install the following Windows Components: See "Installing Windows 2003 components on the Core Server" or "Installing Windows 2008 32-bit components" on page 136.
3. Use Windows Update to install all available critical updates.
4. (For Windows Server 2003 only) Download Microsoft .NET Framework 2.0 Service Pack 1 or newer from the following Web site: http://www.microsoft.com/downloads/details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5&DisplayLang=en. Install the software using the default settings.
5. (For both Windows Server 2003 and 2008) Download Microsoft Web Services Enhancement 2.0 Service Pack 3 (LANDesk Process Manager only) from the following Web site: http://www.microsoft.com/downloads/details.aspx?FamilyID=1ba1f631-c3e7-420a-bc1e-ef18bab66122&DisplayLang=en. Install the software using the default settings.

   Note: This specific version is required.
6. Use Windows Update to install all available critical updates.
7. Launch the EasyManage installation.
8. After ThinkServer EasyManage is installed, enable Security and Patch Manager to obtain the LANDesk 8.8 Software Updates. In the console application, click **Help -> LANDesk -> Security Updates** for a guide to configuring Security and Patch Manager.
9. Install Adobe Flash Player 9 if you plan to use the Management Console functions from the same server on which the Core Server is installed. You can obtain Adobe Flash Player 9 from the Adobe Web site: http://www.adobe.com/products/flashplayer/

Installing Windows 2003 components on the Core Server

To install IIS, ASP.Net, and SNMP on the Core Server, do the following procedure for each component:

1. In the Windows Control Panel, double-click **Add or Remove Programs**.
2. In the toolbar on the left, click **Add/Remove Windows Components** to launch the Windows Components Wizard.
3. Select from the Components list:

- When installing IIS and ASP.NET, click **Application Server**; then, click **Details**.
- When installing SNMP, click **Management and Monitoring Tools**; then, click **Details**.

4. Select the component that you want to install:
   - When installing IIS, select **Internet Information Services (IIS)**; then, click **OK**.
   - When installing ASP.NET, select **ASP.NET**; then, click **OK**.
   - When installing SNMP, select **Simple Network Management Protocol**; then, click **OK**.
5. Click **Next** to continue the wizard.
6. If prompted, insert the original Windows operating system CD. If the autorun launches when you insert the CD, close it. The Windows Components Wizard will automatically detect and install the necessary files.
7. Click **Finish**.

Installing Windows 2008 32-bit components

To install the Windows Server 2008 32-bit components necessary for a ThinkServer EasyManage core server installation, complete the steps in this section.

Installing Web Server Role (IIS)

To install the Web Server Role (IIS), complete the following steps:

1. Click **Start** -> **Server Manager**.
2. Under Roles Summary, click **Add Roles**. The **Add Roles** wizard appears.
3. Click **Next**.
4. Select the checkbox next to **Web Server (IIS)**. A dialog box displays the additional features that are required.
5. Click **Add Required Features**, then click **Next**. In the list of additional role services that can be installed, ensure that the follow are checked:
   - HTTP Redirection
   - Static Content
   - ASP.NET
   - ASP
   - CGI
   - Server Side Includes
   - Windows Authentication
   - IIS 6 Metabase Compatibility

   Note: When you select **ASP.Net** or **ASP**, a dialog box displays the additional role services required. Click **Add Required Role Services**.
6. Click **Install**.

   Note: If IIS is already installed and certain Role Services are still required, expand **Roles** in the tree view on the left in Server Manager and click on **Web Server (IIS)**, then click on **Add Role Services**. Select the necessary role services and click **Install**.

Installing Microsoft SNMP services

To install Microsoft SNMP services, complete the following steps:

1. Click **Add Features** in the **Features Summary** section on the main page of Server Manager.
2. Select the **SNMP Services** checkbox.
3. Click **Next**, then **Install**.

Uninstalling the LANDesk Software Agent

If the Core Server has LANDesk agents on it from a previous Management Suite release, it will fail the autorun prerequisite check. You must remove the old agents by running uninstallwinclient.exe from the \Program Files\LANDesk\ ManagementSuite folder.

Using the remote presence capability and blue-screen capture

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM). When IMM Premium is installed in the server, it activates the remote presence functions. IMM Premium is required to enable the integrated remote presence and blue-screen capture features. Without IMM Premium, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you can still access the Web interface without the key.

After IMM Premium is installed in the server, it is authenticated to determine whether it is valid. If the key is not valid, you receive a message from the Web interface (when you attempt to start the remote presence feature) indicating that the hardware key is required to use the remote presence feature.

IMM Premium has an LED. When this LED is lit and green, it indicates that the key is installed and functioning correctly. When the LED is not lit, it indicates that the key might not be installed correctly.

The remote presence feature provides the following functions:
- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

Enabling the remote presence feature

To enable the remote presence feature, complete the following steps:
1. Install IMM Premium into the dedicated slot on the system board (see "System-board optional-device connectors" on page 29).
2. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

Obtaining the IP address for the IMM

To access the Web interface, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup utility. The server comes with a default IP address for the IMM of 192.168.70.125. To locate the IP address, complete the following steps:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

2. When the prompt <F1> Setup is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.

3. From the Setup utility main menu, select **System Settings**.

4. On the next screen, select **Integrated Management Module**.

5. On the next screen, select **Network Configuration**.

6. Find the IP address and write it down.

7. Exit from the Setup utility.

Logging on to the Web interface

To log on to the Web interface to use the remote presence functions, complete the following steps:

1. Open a Web browser and in the **address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   Note: The IMM defaults to DHCP. If a DHCP host is not available, the IMM assigns a static IP address of 192.168.70.125.

2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

   Note: The IMM is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not a the letter O). You have read/write access. You must change the default password the first time you log on.

3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off of the Web interface if your browser is inactive for the number of minutes that you entered for the timeout value.

4. Click **Continue** to start the session. The System Health page provides a quick view of the system status.

Configuring the Gigabit Ethernet controllers

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

Note: The Ethernet controller for Ethernet connector 1 supports Serial over LAN (SOL).

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. To find updated information about configuring the controllers, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer RD210**, and click **Continue**.

Chapter 7. Solving problems

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the server.

If you cannot locate and correct the problem using the information in this chapter, see the *Hardware Maintenance Manual* for more information.

Diagnostic tools

The following tools are available to help you diagnose and solve hardware-related problems:

- *Diagnostics* **DVD**

  The *Diagnostics* **DVD** provided with your server contains the diagnostic programs for testing the major components of the server. For additional information about the *Diagnostics* **DVD**, see the *Hardware Maintenance Manual*.

- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting tables" on page 144 for more information.

- **EasyLED**

  Use EasyLED to diagnose system errors quickly. See "EasyLED diagnostics panel" on page 17 for more information.

- **Preboot diagnostic programs**

  The diagnostic programs provide problem isolation, configuration analysis, and error log collection. The diagnostic programs are the primary method of testing the major components of the server and are stored in integrated USB memory. The diagnostic programs collect the following information about the server:
  - System configuration
  - Network interfaces and settings
  - Installed hardware
  - EasyLED status
  - Service processor status and configuration
  - Vital product data, firmware, and UEFI configuration
  - Hard disk drive health
  - RAID controller configuration
  - Controller and service processor event logs, including:
    - System error logs
    - Temperature, voltage, and fan speed information
    - Systems management analysis and reporting technology (SMART) data
    - Machine check registers
    - USB information
    - Video and monitor configuration information
    - Video memory test results
    - PCI slot information

  The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to the Lenovo Support Center. Additionally, you can view the server information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser.

- **Checkpoint codes**

Checkpoint codes track the progress of POST routines at system startup or reset. Checkpoint codes are shown on the checkpoint code display on the EasyLED panel.

POST

When you turn on the server, it performs a series of tests to check the operation of the server components and some optional devices in the server. This series of tests is called the power-on self-test, or POST.

If a power-on password is set, you must type the password and press Enter, when prompted, for POST to run.

If POST detects a problem, one or more beeps might sound, or an error message is displayed. See "POST error codes" on page 143 for more information.

Error logs

The POST error log contains the three most recent error codes and messages that were generated during POST. The IMM system event log contains messages that were generated by the IMM. The system event log is a combined log that contains messages that were generated during POST and all system status messages from the service processor (IMM).

The system event log and IMM system event log are limited in size. When each log is full, new entries will not overwrite existing entries; therefore, you must periodically clear these logs through the UEFI Setup Utility program. When you are troubleshooting an error, be sure to clear both the logs so that you can find current errors more easily.

Important: After you complete a repair or correct an error, clear the IMM system event log to turn off the system-error LED on the front of the server.

Entries that are written to the system event log during the early phase of POST show an incorrect date and time as the default time stamp; however, the date and time are corrected as POST continues.

Each system event log entry appears on its own page. To move from one entry to the next, use the Up Arrow and Down Arrow keys.

You can view the contents of the POST error log, the system event log, and the system event/error log from the UEFI Setup Utility program.

When you are troubleshooting PCI Express slots, note that the error logs report the PCI Express buses numerically. The numerical assignments vary depending on the configuration. You can check the assignments by running the UEFI Setup Utility program.

Viewing error logs from the UEFI Setup Utility program

To view the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for Setup` appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the error logs.
3. Use one of the following procedures:

- To view the POST error log, select **System Event Logs**, and then select **POST Error Log**.
- To view the IMM system event log, select **System Event Logs --> IMM System Event Log**

Clearing the error logs

To clear the error logs, complete the following steps:

Note: The POST error log is automatically cleared each time the server is restarted.

1. Turn on the server.
2. When the prompt `Press F1 for Setup` appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the error logs.
3. Use one of the following procedures:
   - To clear the IMM system event log, select **System Event Log --> IMM System Event Log**. Select **Clear IMM System Event Log**; then, press Enter twice.
   - To clear the combined system event/error log, select **Event/Error logs**, and then select **System Event/Error Log**. When any log entry is displayed, press Enter (**Clear event/error logs** is highlighted on each entry page).

POST error codes

The following table describes the POST error codes and suggested actions to correct the detected problems.

Table 11. Abbreviated list of POST error messages

POST message	Failing device or problem found	Suggested action
161	The real-time clock battery has failed.	1. Reseat the battery. 2. Replace the battery or call for service.
162	A device configuration has changed.	• Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings. • Make sure that optional devices are turned on and installed correctly.
163	The time of day has not been set.	Run the Configuration/Setup Utility program and set the date and time.
289	A failing DIMM was disabled.	Make sure that the DIMMs are supported by the server and that they are installed correctly.
301, 303	Keyboard and keyboard controller	Make sure that the keyboard cable is connected and that nothing is resting on the keyboard keys.
1810	PCI device error	Make sure that all PCI adapters are installed correctly. In the Configuration/Setup Utility program, make sure that all PCI devices are enabled. Disable option ROMs and integrated devices that are not needed and set the PCI device boot priority to ensure that the boot device option ROM is able to load.
1962	POST could not find an operating system.	Install an operating system.

POST message	Failing device or problem found	Suggested action
00019*xxx*	Microprocessor *x* is not functioning or failed the built-in self-test.	Make sure that microprocessor *x* is installed correctly. (Trained service technician only) If the problem remains, replace microprocessor *x*.
012980*xx* 012981*xx*	Data for microprocessor *x*	Download and install the latest level of BIOS code.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

If you have just added new software or a new optional device and the server is not working, complete the following steps before using the troubleshooting tables:

1. Check the system-error LED on the operator information panel; if it is lit, check the EasyLED LEDs (see "EasyLED LEDs" on page 159).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

EasyStartup problems

Table 12. EasyStartup DVD

Symptom	Action
• **Follow the suggested actions in the order in which they are listed in the Action Column until the problem is resolved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU's) and which fields are field replaceable units (FRUs).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**
The *EasyStartup* DVD will not start.	• Make sure that the server supports the EasyStartup program and has a startable (bootable) CD or DVD drive. • If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence. • If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The EasyStartup program will not start the operating-system media.	Make sure that the operating-system media is supported by the EasyStartup program. See the EasyStartup User Guide for a list of supported operating-system versions.

CD/DVD drive problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action

The CD-ROM/DVD-ROM drive is not recognized.	1. Make sure that:
	   • The IDE channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the UEFI Setup Utility program.
	   • All cables and jumpers are installed correctly.
	   • The correct device driver is installed for the CD or DVD drive.
	2. Run the CD or DVD drive diagnostic programs.
	3. Reseat the following components:
	   a. CD or DVD drive
	   b. CD or DVD drive cable
	4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
	5. (Trained service technician only) Replace the system board.

A CD or DVD is not working correctly.	1. Clean the CD or DVD. 2. Run the CD or DVD drive diagnostic programs. 3. Reseat the CD or DVD drive. 4. Replace the CD or DVD drive.
The CD or DVD drive tray is not working.	1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the CD or DVD drive. 4. Replace the CD or DVD drive.

General problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a Trained service technician.

Hard disk drive problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic Fixed Disk Test, but the problem remains.	Run the diagnostic for SCSI Attached Disks. **Note:** This test is not available on server models that use any of the available optional RAID controllers. For these server models, check the system error log for RAID device errors (see "POST" on page 142) and use the RAID device utilities to confirm correct disk drive setup (see "Using the Setup Utility" on page 116).
A hard disk drive that you are installing does not fit correctly in the cage.	Make sure that the type of drive is correct for this server (see the *Safety and Warranty Guide*).

Intermittent problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system-error log or IMM system event log (see "POST" on page 142).

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action
The server resets (restarts) occasionally.	1. If the reset occurs during POST and the POST watchdog timer is enabled (click **System Settings --> Integrated Management Module --> POST Watchdog Timer** in the UEFI Setup Utility program to see the POST watchdog setting), make sure that sufficient time is allowed in the watchdog timeout value (**POST Watchdog Timer**). If the server continues to reset during POST, see "POST" on page 142.
	2. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities or ASR devices that may be installed. **Note:** ASR utilities operate as operating-system utilities and are related to the IPMI device driver. If the reset continues to occur after the operating system starts, the operating system might have a problem; see "Software problems" on page 156.
	3. If neither condition applies, check the system-error log or IMM system event log (see "POST" on page 142).
	If the problem remains, call for service.

Keyboard, mouse, or pointing-device problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action
All or some keys on the keyboard do not work.	1. Make sure that: • The keyboard cable is securely connected. • If you are using a PS/2 keyboard, the keyboard and mouse cables are not reversed. • The server and the monitor are turned on.
	2. If you are using a USB keyboard, run the UEFI Setup Utility program and enable keyboardless operation to prevent the 301 POST error message from being displayed during startup.
	3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
	4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Keyboard b. (Trained service technician only) System board

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action

The mouse or pointing device does not work.	1. Make sure that:
	
	  • The mouse or pointing-device cable is securely connected to the server.
	
	  • If you are using a pointing device, the keyboard and mouse or pointing-device cables are not reversed.
	
	  • The mouse or pointing-device device drivers are installed correctly.
	
	  • The server and the monitor are turned on.
	
	  • The mouse option is enabled in the UEFI Setup Utility program.
	
	2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server.
	
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	
	  a. Mouse or pointing device
	
	  b. (Trained service technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

Symptom	Action

The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that:
	   • No error LEDs are lit on the operator information panel.
	   • Memory mirroring does not account for the discrepancy.
	   • The memory modules are seated correctly.
	   • You have installed the correct type of memory.
	   • If you changed the memory, you updated the memory configuration in the UEFI Setup Utility program.
	   • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
	2. Check the POST error log for error message 289:
	   • If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
	   • If a DIMM was disabled by the user or by POST, run the UEFI Setup Utility program and enable the DIMM.
	3. Run memory diagnostics (see "POST" on page 142).
	4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration (two 1 GB DIMMs).
	5. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair match.
	6. Reseat the DIMM.
	7. Restart the server.

Multiple rows of DIMMs in a branch are identified as failing.	1. Reseat the DIMMs; then, restart the server. 2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical pair of known good DIMMs; then, restart the server. Repeat as necessary. If the failures continue after all identified pairs are replaced, go to step 4. 3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace each DIMM in the failed pair with an identical known good DIMM, restarting the server after each DIMM. Replace the failed DIMM. Repeat step 3 until you have tested all removed DIMMs. 4. Replace the lowest-numbered DIMM pair of those identified; then, restart the server. Repeat as necessary. 5. (Trained service technician only) Replace the system board.

Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

Symptom	Action

The server emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. Correct any errors that are indicated by the EasyLED LEDs (see "EasyLED LEDs" on page 159).
	
	2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size.
	
	3. (Trained service technician only) Make sure that microprocessor 1 is seated correctly.
	
	4. Reseat the following components:
	   a. (Trained service technician only) Microprocessor 1
	   b. Microprocessor tray
	
	5. (Trained service technician only) If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor at a time.
	
	6. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. (Trained service technician only) Microprocessor 1
	   b. (Trained service technician only) Microprocessor tray
	
	7. (Trained service technician only) If multiple error codes or EasyLED LEDs indicate a microprocessor error, reverse the locations of two microprocessors to determine whether the error is associated with a microprocessor or with a microprocessor socket.
	   • If the error is associated with a microprocessor, replace the microprocessor.

Monitor problems

Some monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

Symptom	Action
Testing the monitor.	1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. (Trained service technician only) Replace the system board.

The screen is blank.	1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
	2. Make sure that:
	  • The server is turned on. If there is no power to the server, see "Power problems" on page 154.
	  • The monitor cables are connected correctly.
	  • The monitor is turned on and the brightness and contrast controls are adjusted correctly.
	  • No beep codes sound when the server is turned on.
	
	  Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** option in the **Start Options** of the UEFI Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled).
	3. Make sure that the correct server is controlling the monitor, if applicable.
	4. Make sure that damaged UEFI firmware is not affecting the video; see "Using the Setup Utility" on page 116.
	5. Observe the checkpoint LEDs on the system board; if the codes are changing, go to step 6.
	6. See "Troubleshooting tables" on page 144.

The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that:
	  • The application program is not setting a display mode that is higher than the capability of the monitor.
	  • You installed the necessary device drivers for the application.
	2. Run video diagnostics.
	  • If the server passes the video diagnostics, the video is good; see "Troubleshooting tables" on page 144.
	  • (Trained service technician only) If the server fails the video diagnostics, replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. **Notes:** a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). 2. Reseat the monitor cable. 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time: a. Monitor cable b. Monitor c. (Trained service technician only) Replace the system board.
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the UEFI code (see "Using the Setup Utility" on page 116) with the correct language. 2. Reseat the monitor cable. 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time: a. Monitor cable b. Monitor c. (Trained service technician only) Replace the system board.

Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

Symptom	Action
An optional device that was just installed does not work.	1. Make sure that: • The device is designed for the server. • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the UEFI Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An optional device that worked previously does not work now.	1. Make sure that all of the cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. If the failing device is a SCSI device, make sure that: • The cables for all external SCSI devices are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server. 4. Reseat the failing device. 5. Replace the failing device.

Power problems

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
•	**If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

Symptom	Action

The power-control button does not work, and the reset button does work (the server does not start).
Note: The power-control button will not function until 20 seconds after the server has been connected to ac power.
	1. Make sure that the power-control button is working correctly:
	  a. Disconnect the server power cords.
	  b. Reconnect the power cords.
	  c. (Trained service technician only) Reseat the operator information panel cables, and then repeat steps 1a and 1b.
	    • (Trained service technician only) If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	    • If the server does not start, bypass the power-control button by using the force power-on jumper (see "System-board switches and jumpers" on page 30). If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	2. Make sure that the reset button is working correctly:
	  a. Disconnect the server power cords.
	  b. Reconnect the power cords.
	  c. (Trained service technician only) Reseat the EasyLED panel cable, and then repeat steps 1a and 1b.
	    • (Trained service technician only) If the server starts, replace the EasyLED panel.
	    • If the server does not start, go to step 3.
	3. Make sure that:
	  • The power cords are correctly connected to the server and to a working electrical outlet.
	  • The type of memory that is installed is correct.
	  • The DIMMs are fully seated.
	  • The LEDs on the power supply do not indicate a problem.
	  • The microprocessors are installed in the correct sequence.
	4. Reseat the following components:
	  a. DIMMs
	  b. (Trained service technician only) Power switch connector
	  c. (Trained service technician only) Power backplane
	5. Replace the components listed in step 4 one at a time, in the order shown, restarting the server each time.
	6. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.
	7. See "Power-supply LEDs" on page 34.
	8. See "Troubleshooting tables" on page 144.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

Symptom	Action

The server does not start.	Check the four 12-volt power LEDs (A, B, C, and D) on the system board. See "System-board switches and jumpers" on page 30 for the LED locations.
	
	1. If the Channel A power LED is lit, check components in the following order.
	  a. Remove all PCI adapters and riser cards. Try restarting the server. If the server starts, reinstall the PCI adapters and riser cards, one at a time, to isolate the defective adapter.
	  b. (Trained service technician only) System board
	  c. (Trained service technician only) Power backplane.
	
	2. If the Channel B power LED is lit, check components in the order listed below.
	  a. Fans 1 and 2
	  b. (Trained service technician only) Remove microprocessor 2 (if present). Try restarting the server.
	  c. (Trained service technician only) System board
	  d. (Trained service technician only) Power backplane
	
	3. If the Channel C power LED is lit, check components in the following order.
	  a. Fans 3 and 4
	  b. (Trained service technician only) System board
	  c. (Trained service technician only) Power backplane
	  d. (Trained service technician only) Microprocessor 1
	
	4. If the Channel D power LED is lit, check components in the following order.
	  a. Remove all DIMMs. Try restarting the server, listening for any memory error beep codes. If the server restarts, reinstall the DIMMs, one pair at a time, to isolate the defective DIMM ("Removing and installing the DIMM air baffle" on page 48).
	  b. Fans 5 and 6
	  c. (Trained service technician only) System board
	  d. (Trained service technician only) Power backplane

The server does not turn off.	1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
	  a. Press Ctrl+Alt+Delete.
	  b. Turn off the server by pressing the power-control button for 5 seconds.
	  c. Restart the server.
	  d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server.
	
	2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See "Troubleshooting tables" on page 144.

Serial-device problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action

The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	1. Make sure that:
	  • Each port is assigned a unique address in the UEFI Setup Utility program and none of the serial ports is disabled.
	  • The serial-port adapter (if one is present) is seated correctly.
	2. Reseat the serial port adapter.
	3. Replace the serial port adapter.

A serial device does not work.	1. Make sure that:
	  • The device is compatible with the server.
	  • The serial port is enabled and is assigned a unique address.
	  • The device is connected to the correct connector (see "System-board switches and jumpers" on page 30).
	2. Reseat the following components:
	  a. Failing serial device
	  b. Serial cable
	3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
	4. (Trained service technician only) Replace the system board.

Software problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action

You suspect a software problem.	1. To determine whether the problem is caused by the software, make sure that:
	  • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.
	  • The software is designed to operate on the server.
	  • Other software works on the server.
	  • The software works on another server.
	2. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	3. Contact the software vendor.

Universal Serial Bus (USB) port problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**	

Symptom	Action

A USB device does not work.	1. Run USB diagnostics (see "POST" on page 142).
	
	2. Make sure that:
	  • The correct USB device driver is installed.
	  • The operating system supports USB devices.
	  • A standard PS/2 keyboard or mouse is not connected to the server. If it is, a USB keyboard or mouse will not work during POST.
	
	3. Make sure that the USB configuration options are set correctly in the UEFI Setup Utility program (see "Using the Setup Utility" on page 116 for more information).
	
	4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Video problems

See "Monitor problems" on page 151.

EasyLED

EasyLED is a system of LEDs on various external and internal components of the server. When an error occurs, LEDs are lit throughout the server. By viewing the LEDs in a particular order, you can often identify the source of the error.

When LEDs are lit to indicate an error, they remain lit when the server is turned off, provided that the server is still connected to power and the power supply is operating correctly.

Before working inside the server to view EasyLED LEDs, read the safety information in "Safety" on page vii and "Installation guidelines" on page 39.

If an error occurs, view the EasyLED LEDs in the following order:

1. Look at the operator information panel on the front of the server.

    • If the information LED is lit, it indicates that information about a suboptimal condition in the server is available in the IMM system event log or in the system-error log.

    • If the system-error LED is lit, it indicates that an error has occurred; go to step 2.

    The following illustration shows the operator information panel.
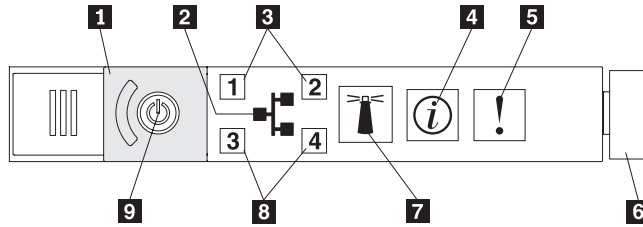
2. To view the EasyLED panel, slide the latch to the left on the front of the EasyLED drawer. This reveals the EasyLED panel. Lit LEDs on this panel indicate the type of error that has occurred.

   The following illustration shows the EasyLED panel:
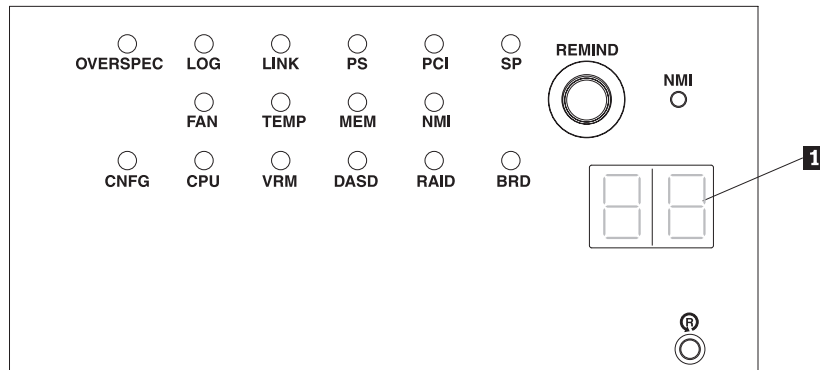
   Note any LEDs that are lit, and then close the drawer.

   Look at the system service label on the top of the server, which gives an overview of internal components that correspond to the LEDs on the EasyLED panel. This information and the information in "EasyLED" on page 157 can often provide enough information to diagnose the error.

3. Remove the server cover and look inside the server for lit LEDs. Certain components inside the server have LEDs that will be lit to indicate the location of a problem.

Remind button

You can use the remind button on the EasyLED panel to put the system-error LED on the operator information panel into Remind mode. When you press the remind button, you acknowledge the error but indicate that you will not take immediate action. The system-error LED flashes while it is in Remind mode and stays in Remind mode until one of the following conditions occurs:

- All known errors are corrected.
- The server is restarted.
- A new error occurs, causing the system-error LED to be lit again.

EasyLED switch

The EasyLED switch allows you to review error indications after the server has been powered down. Press and hold the EasyLED switch, located on the system board, to see the LEDs that were lit before you removed power from the server. The LEDs will remain lit for as long as you press the switch, to a maximum of 25 seconds.

EasyLED LEDs

The following table describes the LEDs on the EasyLED panel and suggested actions to correct the detected problems.

Note: Check the system-error log or IMM system event log for additional information before replacing a FRU.

Table 13. EasyLED panel LEDs

LED	Description	Action
None, but the system error LED is lit.	An error has occurred and cannot be isolated. The error is not represented by a path.	Use the UEFI Setup Utility program to check the system error log for information about the error.
OVER SPEC	The power supplies are using more power than their maximum rating.	If the OVER SPEC LED on the EasyLED panel is lit, or any of the six 12V rail error LEDs (A, B, C, D, E, or AUX) on the system board are lit, follow the instructions below. If the 12V channel A error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the optical drive, fans, hard disk drives, and hard disk drive backplane. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. If the 12V channel B error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the PCI riser card in connector 1, all DIMMs, and the microprocessor in socket 2. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. (Continued on the next page)

Table 13. EasyLED panel LEDs (continued)

LED	Description	Action
OVER SPEC (Continued)	The power supplies are using more power than their maximum rating.	If the 12V channel C error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the SAS/SATA RAID riser card, DIMMs in connectors 1 through 8, and the microprocessor in socket 1. **Note:** The server will not power-on when the microprocessor in socket 1 is not installed in the server. You will need to toggle the switch block (SW3) to pin 6 to power-on the server. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. If the 12V channel D error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the microprocessor in socket 1. **Note:** The server will not power-on when the microprocessor in socket 1 is not installed in the server. You will need to toggle the switch block (SW3) to pin 6 to power-on the server. 3. Restart the server to see if the problem remains. 4. Reinstall the microprocessor in socket 1 and restart the server. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. (Continued on the next page.)

Table 13. EasyLED panel LEDs (continued)

LED	Description	Action
OVER SPEC (Continued)	The power supplies are using more power than their maximum rating.	If the 12V channel E error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove the PCI riser card from PCI riser connector 2 and the microprocessor in socket 2. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains. If the 12V AUX channel error LED is lit, complete the following steps: 1. Turn the server off and disconnect the power from the server. 2. Remove all PCI Express cards, all PCI riser cards, the operator information panel, and the Ethernet daughter card. 3. Restart the server to see if the problem remains. 4. Reinstall each device that was removed in step b one at a time, starting the server each time, to isolate the failing device. 5. Replace any failing device. 6. (Trained service technician only) Replace the system board, if the problem remains.
LOG	An error occurred.	Check the IMM system event log and the system-error log for information about the error. Replace any components identified in the error logs.
LINK	Reserved.	
PS	Power supply 1 or 2 has failed.	1. Make sure that the power supplies are seated correctly. 2. Remove one of the power supplies to isolate the failed power supply. 3. Replace the failed power supply.

Table 13. EasyLED panel LEDs (continued)

LED	Description	Action
PCI	An error has occurred on a PCI bus or on the system board. An additional LED will be lit next to a failing PCI slot.	1. Check the LEDs on the PCI slots to identify the component that caused the error. 2. Check the system-error log for information about the error. 3. If you cannot isolate the failing adapter using the LEDs and the information in the system-error log, remove one adapter at a time from the failing PCI bus; then, restart the server after each adapter is removed. 4. If the problem remains, replace the following components, in the order shown, restarting the server each time: • PCI riser card • (Trained service technician only) Replace the system board, if the problem remains.
SP	The service processor has failed.	1. Remove power from the server; then, reconnect the server to power and restart the server. 2. Update the IMM firmware. 3. (Trained service technician only) Replace the system board, if the problem remains.
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	1. Reseat the fan. 2. Replace the failing fan, which is indicated by a lit LED next to the fan.
TEMP	The system temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit.	1. Determine whether a fan has failed. If it has, replace it. 2. Make sure that the room temperature is not too high. See "Specifications" on page 10 for the server temperature information. 3. Make sure that the air vents are not blocked.
MEM	A memory error has occurred.	Replace the failing DIMM, which is indicated by the lit DIMM latch on the system board (the DIMM LED is underneath the DIMM latch).
NMI	A machine check error has occurred or the NMI button was pressed.	Check the system-error log for information about the error.
CNFG	A hardware configuration error has occurred.	1. Check the microprocessors that were just installed to make sure that they are compatible with each other. 2. (Trained service technician only) Replace the incompatible microprocessor. 3. Check the system-error logs for information about the error. Replace any components identified in the error log.

LED	Description	Action
CPU	A microprocessor has failed.	1. Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is install correctly. 2. (Trained service technician only) Replace the microprocessor.
DASD	A hard disk drive error has occurred.	1. Check the LEDs on the hard disk drives and replace the hard disk drive with the lit LED. 2. Replace the hard disk drive backplane.
RAID	A RAID controller error has occurred.	1. Make sure that a RAID controller is installed correctly. 2. Check the system-error log for information about the error.
BRD	An error has occurred on the system board.	1. Check the LEDs on the system board to identify the component that caused the error. 2. Check the system-error log for information about the error.

Diagnostic programs and messages

The diagnostic programs are the primary method of testing the major components of the server. As you run the diagnostic programs, text messages are displayed on the screen and are saved in the test log. A diagnostic text message indicates that a problem has been detected and provides the action you should take as a result of the text message. Please see the *Hardware Maintenance Manual* for additional information on diagnostic programs and messages.

Power-supply diagnostics

The following minimum configuration is required for the dc LED on the power supply to be lit:
- Power supply
- Power cord

The following minimum configuration is required for the server to start:
- One microprocessor in microprocessor socket 1
- One 1 GB DIMM on the system board
- One power supply
- Power cord
- Six cooling fans

The following illustration shows the locations of the power-supply LEDs.
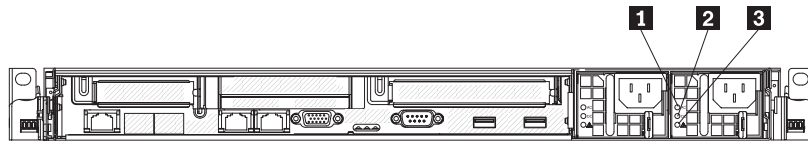
1	AC LED (green)
2	DC LED (green)
3	Power supply error LED (amber)

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED on the operator information panel and suggested actions to correct the detected problems.

Power-supply LEDs		Power-supply error LED	Description	Action
AC	DC			
Off	Off	Off	No power to the server, or a problem with the ac power source.	1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Remove one power supply at a time.
Off	Off	On	No power to the server, or an internal power supply problem.	• Make sure that the power cord is connected to a functioning power source. • Replace the power supply.
Off	On	Off	Power supply problem.	Replace the power supply.
Off	On	On	Power supply problem.	Replace the power supply.
On	Off	Off	DC source power problem.	1. Reseat the power supply. 2. If the problem remains, check the 240v Aux channel error LED on the system board and do the following: a. If the LED is lit, (trained service technician only) replace the system board. b. If the LED is not lit, replace the power supply.
On	Off	On	Power supply problem.	Replace the power supply.
On	On	Off	Standby power problem.	1. View the event log (see the *Hardware Maintenance Manual* for information about error logs). 2. Remove one power supply at a time.
On	On	On	Power supply problem, but still operational.	Replace the power supply.
On	On	Flashing	System power-on problem.	1. View the system-error log (see the *Hardware Maintenance Manual* for information about error logs). 2. Press the power-control button on the operator information panel. 3. (Trained service technician only) Use the force-power-on jumper as a debugging aid (see the *Hardware Maintenance Manual* to determine whether the information panel switch and cable are faulty). 4. (Trained service technician only) Replace the microprocessor.
On	On	Off	The power is good.	No action is necessary.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you. This section contains information about where to go for additional information about Lenovo and Lenovo products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual* .
- Go to the at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by using the information available on the Lenovo support site or by following the troubleshooting procedures that Lenovo provides in the documentation that is provided with your Lenovo product. The documentation that comes with Lenovo systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. Most of the documentation for your server is on the *ThinkServer Documentation* DVD provided with your server. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.lenovo.com/support and follow the instructions.

Getting help and information from the World Wide Web

On the World Wide Web, the Lenovo Web site has up-to-date information about Lenovo systems, optional devices, services, and support. For general information about Lenovo products or to purchase Lenovo products, go to http://www.lenovo.com. For support on Lenovo products, go to http://www.lenovo.com/support.

Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center.

These services are available during the warranty period:
- **Problem determination -** Trained personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair -** If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management -** There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) available that apply to your hardware.

These items are not covered by the warranty:
- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to http://www.lenovo.com/support and click **Support phone list** or refer to the safety and warranty information provided with your computer.

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call. Have the following information available:
- Machine type and model
- Serial numbers of our hardware products
- Description of the problem
- Exact working of any error messages
- Hardware and software configuration information

Using other services

If you travel with a Lenovo notebook computer or relocate your computer to a country where your desktop, notebook, or server machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.lenovo.com/support, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of, or questions related to, Service Packs for your preinstalled Microsoft Windows® product, refer to the Microsoft Product Support Services Web site at http://www.support.microsoft.com/directory/, or you can contact the Customer Support Center. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at http://www.lenovo.com/.

Lenovo product service

台 灣 **Lenovo** 產 品 服 務 資 訊 如 下 ：
荷蘭商思惟個人電腦產品股份有限公司台灣分公司
台北市信義區信義路五段七號十九樓之一
服務電話: **0800-000-700**

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been

estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Trademarks

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo
Lenovo logo
ThinkServer

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

- IBM
- ServeRAID

Intel and Intel Xeon are trademarks of Intel Corporation in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

Adaptec and HostRAID are trademarks of Adaptec, Inc., in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Red Hat, the Red Hat "Shadow Man" logo, and all Red Hat-based trademarks and logos are trademarks or registered trademarks of Red Hat, Inc., in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Compliance with Republic of Turkey Directive on the Restriction of Hazardous Substances

Meets requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment (EEE).

Lenovo ürünü Turkiye cumhuriyeti'nin Elektrikli ve elektronik eşyalardaki zararli madde kullaniminin sinirlandirilmasi hakkindaki direktif şartlarina uygundur (EEE).

EEE Yönetmeliğine Uygundur.

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on Lenovo product recycling offerings can be found on Lenovo's Internet site at: http://www.lenovo.com/lenovo/environment/recycling.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. Lenovo recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. Lenovo dispone de una serie de programas y servicios de devolución de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de Lenovo en el sitio web de Lenovo
http://www.lenovo.com/lenovo/environment/recycling.
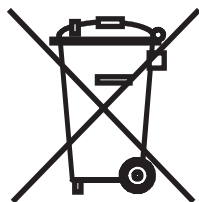
Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local Lenovo representative.

Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to http://www.lenovo.com/lenovo/environment or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.

For the European Union:

Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueue dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to http://www.lenovo.com/lenovo/environment.

For California:

Perchlorate material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Electronic emissions notices

Federal Communications Commission (FCC) statement

This section includes electronic emissions notices and the FCC statement.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in

accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

German Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher "Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4).

Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Japanese recycling statements

リチウム電池交換後の廃棄処理について

本機器には、ボタン型のリチウム電池がシステム・ボード上に取り付けられています。この電池を交換する場合には、お買い上げいただいた販売店にお問い合わせいただくか、弊社の修理サービスをご利用ください。万一お客様が交換された場合の古い電池を廃棄する際は、ビニール・テープなどで絶縁処理をして、お買い上げいただいた販売店にお問い合わせいただくか、もしくは産業廃棄物処理業者に処理をご依頼ください。また一般家庭などから、一般廃棄物として自治体に廃棄を依頼するときは、地方自治体の条例・規則に従って廃棄してください。

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

企業のお客様が、本機が使用済みとなり廃棄される場合は、廃棄物処理法の規定により、産業廃棄物として、地域を管轄する県知事あるいは、政令市長の許可を持った産業廃棄物処理業者に適正処理を委託する必要があります。また、弊社では資源有効利用促進法に基づき使用済みパソコンの回収および再利用・再資源化を行う「PC 回収リサイクル・サービス」を提供しています。詳細については、以下のURL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/pcrecycle

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003 年10 月1 日よりスタートしました。詳細については、以下の URL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/personal

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属(鉛など) が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

声　　明

此为 A 级产品，在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Korean Class A warning statement

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Index

K

N

T

temperature   11
thermal grease   75
TOE   11
tools, diagnostic   141
trademarks   172
turning off the server   36
   integrated management module   37
turning on the server   35
TÜV gloss statement   175

U

Universal Serial Bus (USB) problems   157
unknown password, bypassing   120
updating
   server firmware   73
   the server configuration   113
updating firmware   130
USB
   connector   15, 26
user password   120
   See power-on password
using
   EasyStartup   127
   LSI Configuration program   123
   the boot manager program   122
   the remote presence feature   137
Utility program
   IBM Advanced Settings   134
utility, Setup
   menu choices   116
   starting   116

V

video connector
   front   15
   rear   26
video controller, integrated
   specifications   11

W

Web site
   Lenovo support   5, 39, 73, 130, 131, 139
   publication ordering   167
   support   167
what the server offers   7

lenovo ®

Part Number: 46U1926

Printed in USA